

MARCH 12, 1934

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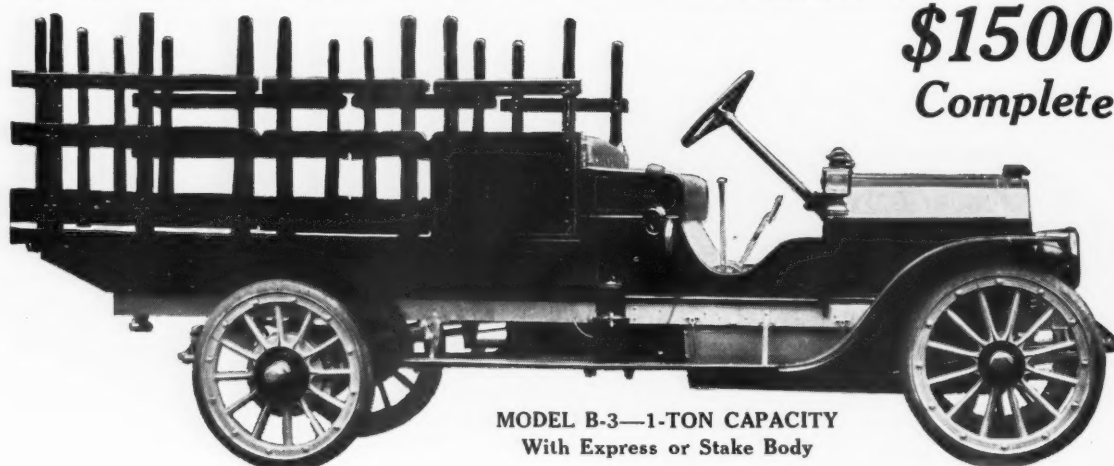
MOTOR AGE



L'Mabie

"The MENOMINEE" TRUCKS

FOR ECONOMY



MODEL B-3—1-TON CAPACITY
With Express or Stake Body

Built For Service Down To the Last Bolt

Due to unique manufacturing and laboring conditions we are able to build this **QUALITY** 1-ton truck at a price which defies competition. The price of this truck is not inflated one penny's worth.

You can take this truck apart—piece by piece—and account for every dollar of its price.

Don't **PAY MORE** for a 1-ton truck that won't **DO MORE** than the **MENOMINEE**. Write for catalog containing details in full.

NOTE THESE SPECIFICATIONS

MOTOR: 35 H. P. four cylinder (4x5).

WHEEL BASE: 122 inches.

FRONT AXLE: I-beam, 3x1 $\frac{3}{4}$ inches, drop-forged.

REAR AXLE: Full-floating nickel steel, live axle shafts. Double gear reduction.

GEAR RATIO: 7 to 1.

CARBURETOR: Stromberg.

TRANSMISSION: In unit with motor. Selective type 3-speeds forward and 1 reverse. Nickel steel driving shaft.

CLUTCH: Multiple dry discs.

LOADING SPACE: Express body 102x46 inches. Stake body 102x60 inches.

CARRYING CAPACITY: 2000 pounds.

OILING SYSTEM: Automatic and a combination of force and gravity feed.

SPRINGS: Front, semi-elliptic, 2 $\frac{1}{2}$ x42 inches. Rear, platform, three point suspension, 2 $\frac{1}{2}$ x42 inches.

FRAME: 4-inch heat treated channel steel.

CONTROL: Hand levers located in center of car.

STEERING GEAR: Lavigne special truck gear, with 18-inch hand wheel.

RADIATOR: Vertical tube.

BRAKES: Internal and external.

WHEELS: 34 inch, artillery type.

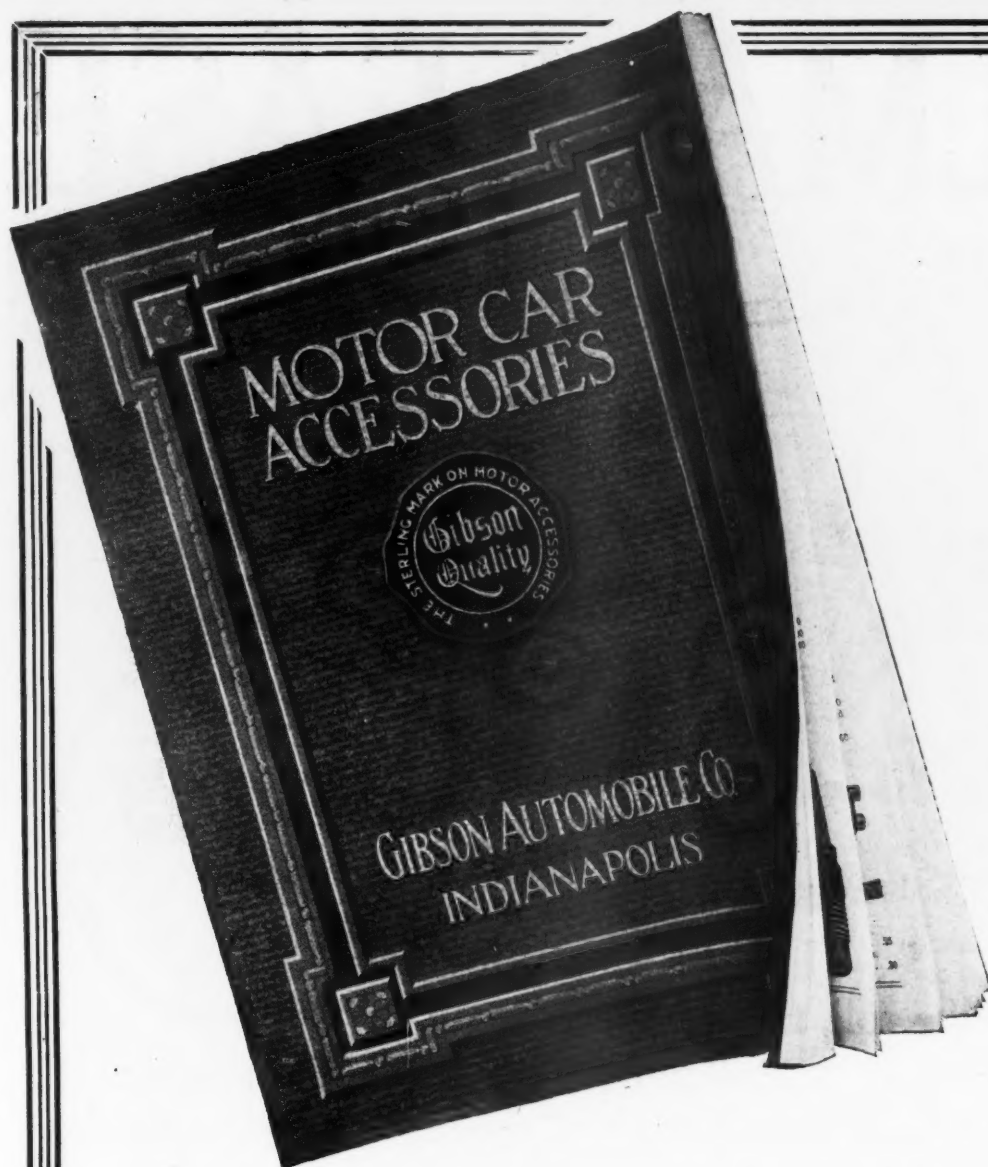
TIRES: 34x3 $\frac{1}{2}$, detachable, solid rubber.

EQUIPMENT: 2 gas head lights and generator. Two side oil lamps; one tail lamp, horn, jack and tool kit.

DEALERS: MENOMINEE 1500-lb. trucks at \$1200, 1-ton trucks at \$1500, and 1 $\frac{1}{2}$ -ton trucks at \$1950, put a dealer in position to close with 90% of the truck prospects in his territory. We have some choice territory still open. We can make immediate deliveries. Write for generous agency plan.

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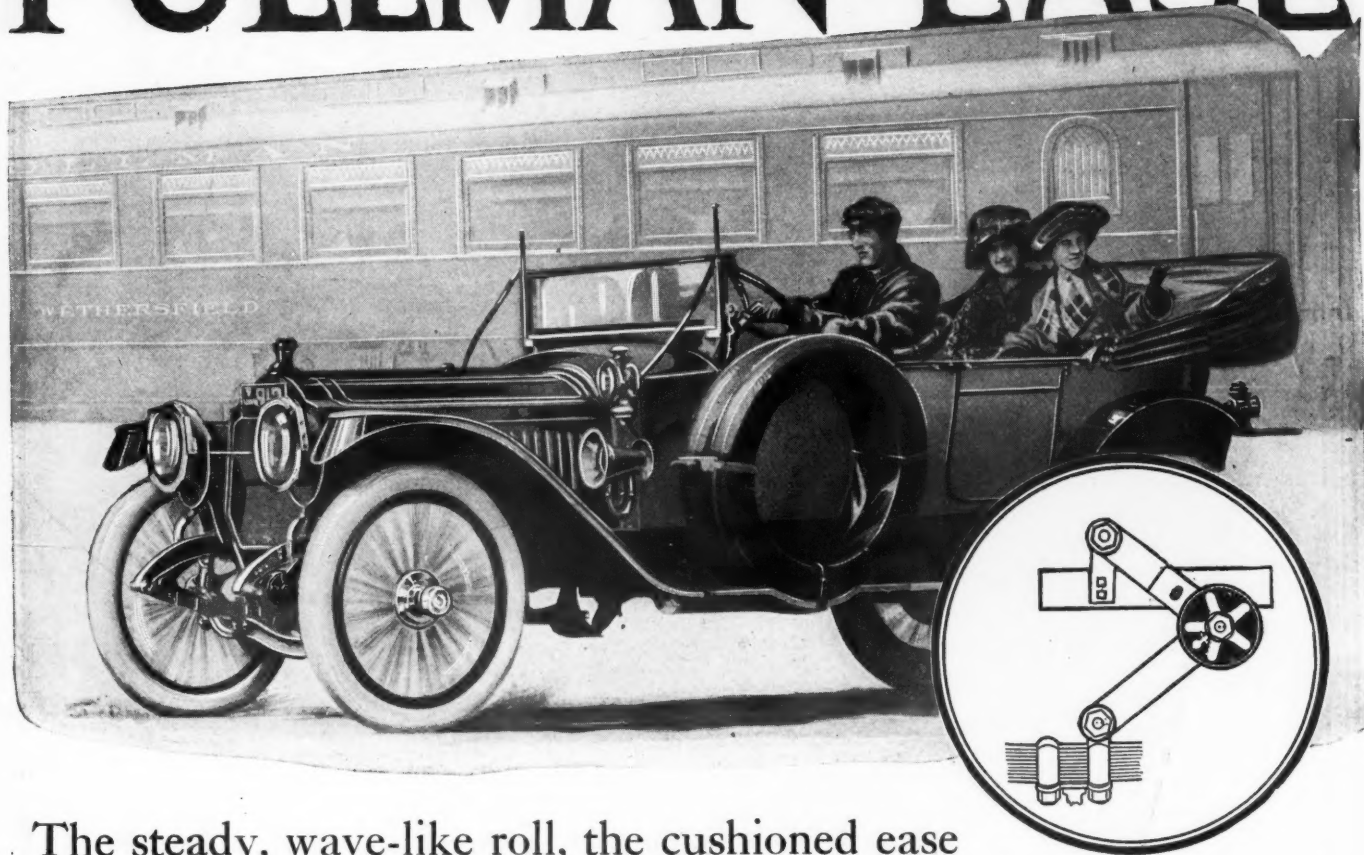


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"The Pioneer and the Best"

Indispensable for both safety and comfort. *Money-saving* beyond the shadow of a doubt.

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BEWARE OF SOLICITORS OFFERING SUBSCRIPTIONS AT CUT RATES.

Volume XXV

MARCH 12, 1914

No. 11

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Spring Overhauling Time Is Accessory Installing Time

At no season of the year do motorists consider accessories more attentively than in the spring.

Between now and the first of May, some 1,000,000 cars in this United States are due for a good overhauling.

Overhauling time is the logical time for equipping this million cars with new accessories—with electric lights, self starters, power pumps, warning signals, automatic gear shifts, shock absorbers, piston rings, carburetors, magnetos, spring lubricating devices, and other accoutrement. By fitting out their cars in the spring, motorists get the use of new equipment throughout the entire motor season. "Two birds are killed with one stone"—the car thoroughly overhauled, and the latest accessories installed—all on one trip to the garage.

For the reasons above, accessory manufacturers will find *right now* a peculiarly advantageous time to push their advertising *hard*. Sometimes the slightest suggestion is all that is necessary to swing motorists "on the fence" over to *their* product. A volley of publicity at this time will puncture a lot of pocketbooks.

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Motor Age
910 So. Michigan Ave.
Chicago, Ill.



Splitdorf Ford Special Plugs

are NEW AND SPECIALLY CONSTRUCTED for Ford cars. Long in body and specially made for Ford cylinder construction, they are easily recognized with hexagonal porcelains. Their insulation is high quality imported mica and they are designed and manufactured to absolutely withstand the breaking-down effects of high tension current.

Just realize that the plug is as important to the running of a motor as its most vital unit and insist upon SPLITDORF FORD SPECIAL PLUGS.

The highest priced automobile as well as the most popular priced car must have the BEST PLUGS to get the BEST MOTOR EFFICIENCY, and SPLITDORF "COMMON SENSE" PLUGS have always been the standard for effective results.

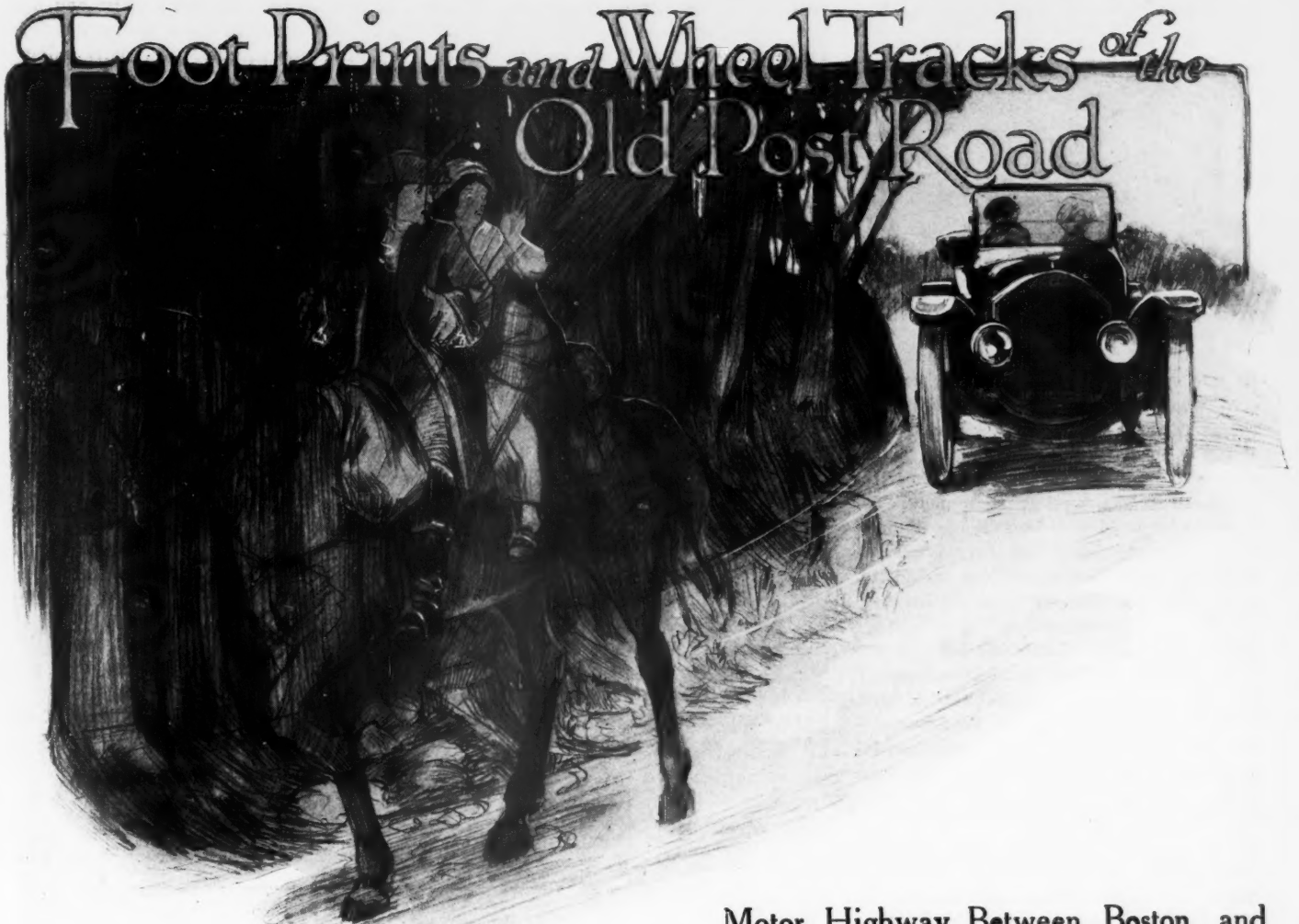
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MOTOR AGE

Foot Prints and Wheel Tracks of the Old Post Road



Motor Highway Between Boston and New York Heritage from Colonial Fathers

BOSTON, March 4—Look back into the years, be they many or be they few, and recall the school days when first you learned, or were stirred by the words "*Listen, my children, and you shall hear, Of the midnight ride of Paul Revere,*" and all the rest of Longfellow's famous poems of those stirring Revolutionary times. How many are there who know that this is the first of the series in the *Tales of a Wayside Inn*, and is known as the landlord's tale? It is. And today this same Wayside Inn stands as it did in the years past, welcoming the many travelers passing along the old post road between New York and Boston. It is one of the few remaining inns that link the historic past to the prosaic present.

By James T. Sullivan

When we of the present with big motor cars, riding easily between the metropolis of the east and the hub of New England, sweep along this historic highway, is there one in the thousand that seeks to turn back the pages of history to learn something about the country through which he is passing, to discover an interesting history of roads and inns?

Indian First Colonial Messenger

Delving into the past reveals the fact that the early settlers had to depend upon Indians for intercommunication between what was then east and west, or New England and New York. The new year of 1673 marked the progressive step of

having the first regular mounted postman between New York and Boston. Before that it was the custom to give some good Indian a package and start him along with a parting of good luck and best wishes and the hope that he would get through the tangled forest. If it was winter, a strenuous task was ahead of the redman who must plough through the forests, cross frozen streams, camp out wherever he could, and seek a shelter from some white inhabitant who eyed him with suspicion but humanely took him in. And the winters of those days were real ones—the kind we hear elderly folks sigh for now "as the good old days"—when the snow piled into drifts high in the air and the rivers were frozen from early fall un-



THE INDIAN MESSENGER PLOUGHED THROUGH DENSE FORESTS

til late spring. And history does not record what munificent rewards were paid these faithful messengers. Perhaps a string of beads that he might give to the chief's daughter; a pinch of tobacco with which to smoke himself sick; maybe a hooker of rum to give him dreams of daring deeds. Whatever the stipend was, it may be assured that it was not enough to buy motor cars had such vehicle been in vogue 2½ centuries ago.

Postman Waits a "Little While"

When the mounted postman was ready to set out on his first trip January 1, 1673, with a letter from Governor Francis Lovelace, royal governor of New York, to Governor Winthrop of Massachusetts, it was found that some dispatches from the south had not arrived and time hanging heavy on the hands of the people, it was decided to wait a little while. A "little while" in those days was quite different from now and so it was January 22 when the rider left on his journey. He started from what is now the Battery in New York, but in those days it was known as the fort. It was Governor Lovelace's idea that intercommunication would bring about more friendly relations between the colonies. Before starting the rider was given all sorts of advice. He was admonished to conduct himself as a gentleman, and if he met anyone on the way who was in need of assistance to cheerfully give it to him. He was to proffer advice, and not lag on the journey with others who were in the mood to saunter lazily. Having thus been filled up with sealed packages and suggestions designed to make the rider feel his importance, he set off on his trip.

The limit set on the journey was a month. This allowed 2 weeks each way, for the rider was told not to tarry in

Boston. He changed horses in Hartford. For many miles there were no roads, simply Indian trails through deep woods, and while it might have been a healthy trip, it was not by any means cheerful as we know traveling nowadays. Reaching Boston, the post rider went to the post office on Washington street, located between the old state house and the old South church.

Postman Was Not Overburdened

The postal service did not become immensely popular. For several years it was a sort of accommodation for the higher officials in the various colonies. This is not surprising since the settlers generally stuck close to their homes and there were no family ties in other places that necessitated missives. Another reason for lack of patronage was that following the inauguration of the postal rider came the post rider. This worthy contracted to deliver merchandise from one place to another. He was a sort of expanded rural free delivery-parcel post combination, only he worked for himself and not for the colonies. He was not supposed to carry mail, but if a rider slipped a few letters in an inside pocket and his palm was greased with a few pence, there was no one to hold him up on a charge of defrauding the government. Naturally this cut into the postal rider's receipts.

Another duty the post rider assumed was that of acting as escort for women on journeys from one section to another, quite a number of the colonial belles making visits in those days. With all the grace of a Raleigh, the post rider would escort his charges, seeking to pass the time merrily with quips and smiles. In addition to this he also performed a job as reporter. He would give out the news as he passed along, gather it up and disseminate it verbally. So the people were kept in-

formed fairly well of what was taking place 2 and a half centuries ago, all things considered.

There were no stage coaches in those days. The traveling was done on horses, and when a woman made a journey, if she had no horse of her own or could not borrow one, she rode on a pillion behind the driver. These pillions were flat cushioned affairs arranged with a platform stirrup and placed on the haunches of the horse. They were not comfortable, nor yet very uncomfortable. The woman would place an arm around the man's waist and hang on. Of course the horse was not speeded up, and consequently the daily mileage was not very long, but then the visitors made only short journeys.

First Highway Act in 1639

Meanwhile Massachusetts started to build roads. Its first highway act had been passed in 1639, providing for work being done on roads by the inhabitants, and when the postal service began in 1673 there were some highways out in the state beyond Boston. When the postal service was put on a regular schedule basis in 1691, the problem of roads began to be considered. The old Connecticut trail was then very well defined and with the coming of a new century, the people began to busy themselves with better highways. In the history of New York one may find under the date of October 23, 1713, the first official mention of the old post road in an act that says:

"Whereas, the highways and post road through Manhattan island leading from the city of New York to Kingsbridge are become ruinous and almost impassable, very dangerous to all persons that pass those ways:

"Be it enacted, from the limits of the Harlem patent to the causeway of Kings-



START OF FIRST MOUNTED POSTMAN FROM NEW YORK ON 2-WEEKS' JOURNEY TO BOSTON AND RETURN

bridge shall be from time to time hereafter cleared, repaired and amended by the inhabitants of the Harlem division."

While New York was taking the matter up at one end, Massachusetts was busying itself at the other, extending the roads and repairing them. For the next 50 years this work increased due to the importation of carriages, many of which were in use by 1750. The corduroy road was adopted in those days and patches of these roads now are found from time to time by modern highway builders. With the advent of roads came the ferries. There are in existence today some very good paintings of what waiting for the ferry must have been like in the old days. It was not until after the revolution that bridges were built, and while history does not tell of any elopements in those days, what a fine time the lovers had when they had crossed the stream on the ferry before an irate parent had reached the spot, knowing the advantage it gave them. The increase in population necessitated a greater demand for inter-communication and so the extension of the roads was made so that the New England Almanack for 1765 gave two routes to Hartford. As New York was working on the other end, the post road was then an actuality.

Stage Coach Line Opened

So well had the work of clearing the forest paths and turning the bridle trails into real roads progressed that in 1772 it was possible to start a stage coach line between the two cities. That was the beginning of an era of good cheer that came about through the opening of taverns and inns. In the New York Journal of June

post road. He traveled it the first time when he went to Cambridge to take command of the American army. The old Washington elm is still standing in the shadow of Harvard college. Mrs. Washington came with him. It was not until October, 1789, however, that Washington came over the road on his historic trip. He was then the first president of the United States, and ever since a claim has been set up for about every inn between New York and Boston as the one where he stopped. There is some authenticity of the claims of some of the places as revealed in his diary.

The success of the Brown stage between New York and Boston led Levi Pease, who had a sort of confidential position in the Revolutionary army as a carrier of dispatches, buyer of supplies, etc., to decide to open a stage line. He knew the country very well, due to his war experience, and he was well liked and enjoyed the confidence of a number of prominent men, among them General Lafayette. First he sought backing for the enterprise, asking for partners, but not being able to get them he found Reuben Sykes, a young stage driver, willing to join in the enterprise. In 1786 Pease started from Boston and Sykes from Hartford at the same time and thus inaugurated a stage line that prospered and made both men comparatively wealthy. The trip took 4 days. Later the line was extended to New York.

The start in Boston was made from the Boston Inn, which Pease eventually bought and which stood on Tremont street opposite Boston common, the present site of St. Paul's church. In the Massachusetts Spy, published in Worcester, Mass., Pease published an advertisement of his line on January 5, 1786, that reads as follows:

Stages — Portsmouth, N. H., to Savannah, Ga.

There is now a line of stages established from New Hampshire to Georgia which go and return regularly and carry the several permission of congress. The stage from Boston to Hartford, Conn., sets out during the winter season from the house of Levi Pease at the sign of the New York stage, opposite the mall in Boston, every Monday and Thursday at precisely 5 o'clock, going

as far as Worcester on the evenings of those days, and on the days following proceed to Palmer, and on the third day reach Hartford. The first stage reaches the city of New York on Saturday evening, and the other on the Wednesday evening following. The stages from New York for Boston set out on the same days and reach Hartford at the same time as the Boston stages. The stages from Boston exchange passengers with the stages from Hartford at Spencer, and the Hartford stages exchange with those from New York at Hartford. The passengers are again exchanged at Stratford ferry and not again until the arrival at New York. Fare three pence per mile, with liberty to carry 14 pounds of baggage. The stage runs three times weekly in summer and twice in winter.

Levi Pease was another such man as

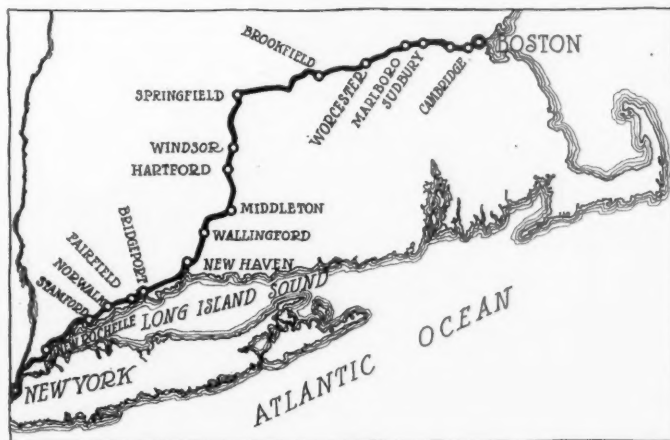


WAITING FOR THE FERRY WAS NOT AN UNCOMMON OCCURRENCE

James J. Hill of the present day. He could see far ahead and was planning all the time to increase his service. Because of the little expense attached to it, he made his headquarters at Shrewsbury, Mass., near Worcester, his home town and on the post road. He speeded up his coaches so that instead of taking a week to bridge the distance between New York and Boston, his passengers covered the distance in 4 days. Then he inaugurated what was called the fast mail. This carried but four passengers and stopped only at the principal places for a change of horses. He ran everything on thorough business principles. He was really the father of the limited traveling with this fast mail coach for which an extra fare was charged; and those not caring to pay the price could travel in the slower stages at the usual rates. But he always had a demand for his limited seats. He insisted that passengers should book passage the night before, and then pay at that time one-half the fare to where they were going, if it was one of the local stops, or half the fare to the first exchange of passenger point. His fast mail soon had to be run three times a week, and with the other stages on alternate days he had stages going every day.

Pease Gets Turnpike Charter

Pease then got busy with the road question and received the first charter in Massachusetts for a turnpike. This was in 1808 and it gave him the right to run this turnpike from Boston to Worcester. Thus



MAP SHOWING ROUTE OF THE OLD POST ROAD

22, 1772, was printed an advertisement that the stage coach of Jonathan and Nicholas Brown started that morning from New York for Boston on its initial journey. It was a 6-day trip, beginning Monday morning and ending on Saturday evening. The start back was made the following Monday morning, 2 weeks being allowed for the round trip. This met with approval and the trips were increased.

Then came the Revolutionary war. This brought George Washington over the old

he became known as the "father of turn-pikes."

Boats Rivals of Stage Lines

With another century rounded out competition began to grow keen and stages were run in all directions. The journey to New York was robbed of its torture by boats that sailed from Providence, New London and Hartford and other places in Connecticut. These boat lines cut into the stage business somewhat. But there was rivalry, too, in the boat business as the following advertisement from one of the stage books of 100 years ago shows:

Hartford and New York. The new fast steamer, Bunker Hill, Captain M. S. Harrison, leaves Hartford Monday, Wednesday and Friday at 2 p. m. Leaves New York Tuesday, Thursday and Saturday at 5. Fare \$1. This is the boat most confidently recommended for safety, dispatch and good treatment to travelers. The Lexington and Cleopatra run on this route in opposition, without much system, at any price from \$1 to \$3.

Apparently the owners of the Lexington and Cleopatra were not good advertisers, and there was no law of libel in those days. In 1829 the stages flourished so that there were seventy-seven lines from Boston. In addition to the New York city route the stages were going through to Albany, where one could go for \$6, or for \$8.75 by the fast mail line. The fare to Worcester was \$2. It was as much more to Hartford and the fare to New York ranged from \$8 to \$10. In 1832 the number of stages running out of Boston reached their high water mark of 106. They spread all over New England and through the south and west. They had been so systemized that a passenger could get a through ticket then to about any destination.

Stage Coaches Speed Up

Speed was a requisite then as now. The Boston and New York mail in those days had cut the distance by short cutoffs to 210 miles, and the time was greatly lessened. Here was the schedule as given:

Leave Boston, daily, 10 p. m.

Arrive Worcester, 4 a. m.

Arrive Hartford, 2 p. m.

Arrive New York, 10 a. m.

That gave a 36-hour run between the two cities, a great improvement over the early stages that took a week. The ordinary route took the traveler through Bos-

ton, Cambridge, Watertown, Sudbury, Marlboro, Worcester, Brookfield, Weston, Palmer, Springfield, Windsor, Hartford, Wethersfield, Middletown, Wallingford, New Haven, Stratford, Fairfield, Norwalk, Bridgeport, Stamford, Rye, New Rochelle, Kingsbury, Harlem to Cumberland, with taverns down by Courtland, Chatham or Ann streets.

Then came the railroads in the late 30's and early 40's, marking the beginning of the end of the stage coach days. The first steam road ran out a few miles to Needham. Worcester people could ride in a stage from that city to Needham and then 90 to Boston by train, leaving at 7 a. m., reaching Boston before noon, spending a few hours there and getting home at 8 p. m. Bostonians could do the same or continue on their way west. The trains averaged about 20 miles an hour. That was remarkable speed then considering the



THE RIDE FROM BOSTON TO NEW YORK WAS A TIRESOME JOURNEY AND NOT WITHOUT ADVENTURES AND PERILS

stage coach speed of 10 miles an hour with an average stop every 18 miles. Some idea of how speed was regarded is furnished by the following comment by a Providence editor on a trip between his city and Boston, a distance of about 40 miles:

"We were rattled from Providence to Boston in 4 hours and 50 minutes—if anyone wants to go faster he may send to Kentucky and charter a streak of lightning."

The early stage coaches were crude affairs. They lacked springs, and carried eight or ten passengers crowded together like sardines. The horses, usually four, had all kinds of trappings for harness, sometimes old ropes and pieces of chain.

Improvements came slowly. In 1828 Lewis Downing of Lexington and Stephens Abbott of Salem formed a partnership and built the famous Concord coaches. These had springs and were remarkably comfortable, so much so that the early railroad trains were patterned after them. Many of these coaches are in use today. The railroads had their accidents and this led many to stick to the stages until better rail facilities were provided, consequently the stages were not driven out of business entirely, but gradually the railroads extended their lines through to Albany and New York before the '50s and the end of the stages, except to make connections with railroads, was in sight.

Wayside Inn Most Famous

With the stage coach days there grew up the inns and taverns on the route. Of all of them the most celebrated is the Wayside Inn. It is still standing in

Sudbury, Mass. The writer motored out to it a few weeks ago and had some tea, toast and marmalade and was made welcome by the women who have charge of it now. The same old rooms where Washington and Lafayette slept remain as they were then with the high post beds, winding stairways, etc. It was an admirable setting for Longfellow's tales. It dates back to 1666 and was first known as the Red Horse tavern. For many years it sheltered all sorts of people, great and humble, and it was passed on from one generation of the Howe family to another. Of all the

taverns of the early years of the 18th century none were more respectable and had a greater reputation for hospitality. One may find scratched on a pane of glass now carefully preserved, this bit of verse written by a Boston visitor under the date of June 24, 1774:

"What do you think,
Here is good drink,
Perhaps you may know it;
If not in haste, do stop and taste,
You merry folks will show it."

Taverns at Shrewsbury

Shrewsbury was another place where taverns flourished. This was due to the fact that Pease made the headquarters of his stage line there. There was the Old



BENJAMIN FRANKLIN MEASURED OFF THE MILES AND HAD STONES ERECTED

Arcade, Balch's Inn and Harrington's tavern. Pease also had his own tavern at Shrewsbury as he had in Boston. There were covered sheds outside for teamsters on the way to market with their crops. Chairs were provided and there were shelves like bunks for luggage, the people being honest in those days and clothing not having to be checked. One of the strange things about the old road was that there were no marauders abroad and everyone was safe.

Drivers Used Crude Elevator

On the outside of the tram-sheds were holes in which one might place his fingers to get a grip, get the toe of one's boot in another hole and by careful crawling or climbing up the wall enter the tavern at the second story through the window to reach the place where drivers were supposed to sleep. This was so as not to disturb or annoy the family or regular guests of the stages who were forced to follow the lines of the old verse that says:

*"Early to bed and early to rise,
Makes a man healthy, wealthy
wise."*

In Revolutionary days the Pease tavern was kept by Major John Farrar, an officer in the army, and it is one of the places where Washington stopped. Then there was the Exchange hotel in Worcester, another noted place. It was built in 1784 by Sykes, Pease's partner, who had become wealthy. It was known as the U. S. Arms, Thomas' Coffee House and Sykes Stage Hotel. Washington stayed in this place in 1789 on his way through New England. Lafayette was also a guest there.

Another tavern that enjoyed Washington's patronage, but now gone, was the Parsons house kept by Zenas Parsons in Springfield. Then there was the famous Bates Tavern, kept by Uncle Jerry and Aunt Phoebe Bates, that had an international reputation. Foreigners sometimes passed right through Boston to put up there. Another well known place was the Massasoit house where Kossuth, the Hungarian patriot, in 1852 made an address from the balcony and which also housed Dickens a decade before. Also to be recalled is the famous Sutton tavern kept by Bartholomew Woodbury. Further west was the Taylor tavern at Danbury that in its day was noted by all who passed over the post road as an admirable place to stop. Hospitality Hall was the name bestowed upon the Webb house in Wethersfield, another of the Washington taverns still standing.

Washington Pays Inn Tribute

Of all the taverns along the road none received such a flattering bit of praise as Haviland's Inn at Rye, N. Y. It was formerly known as Brown's tavern, christened for Peter Brown who kept it in 1731. Dr. Ebenezer Haviland bought it. He had been a surgeon in the Continental army and was killed during the war so his widow conducted the house. It sheltered many illustrious men among them John Adams and Washington, the latter referring to it in his diary of his trip

through New England in 1789 following his inauguration as president, as follows:

"After dinner, through frequent showers, we proceeded to a tavern kept by Mrs. Haviland at Rye, who keeps a very neat and decent inn."

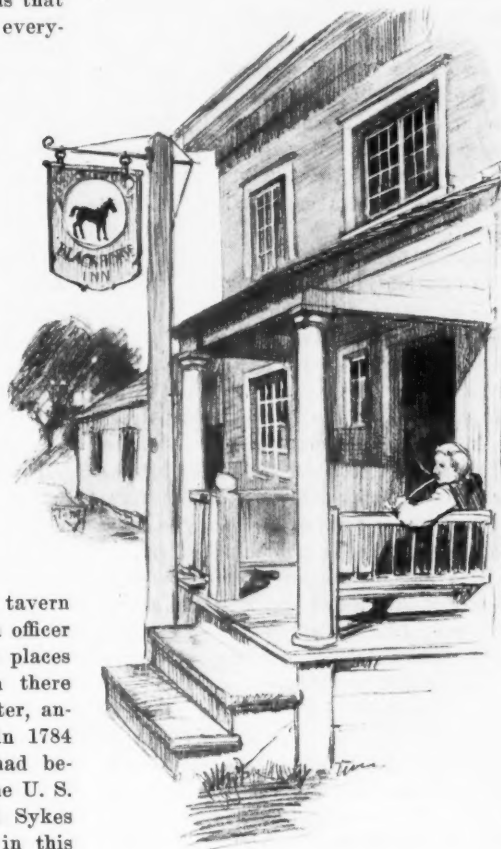
On the same day Washington wrote of another place as follows: "Baited at Westport and lodged at Major Marvin's, 9 miles farther, which is not a good house, though the people of it were disposed to do all they could to accommodate me."

Traveling in those days was not a luxurious pastime. The traveler set out either at 10 at night on the fast mail, or at 5 in the morning. On reaching the night stop, he or she would crawl out of the stage sometimes aching all over with stiffness or from the bouncing one received in the springless wagons. For the short-distance traveler it was not so bad. The fellow going a long way suffered the tortures of the damned at times. The time for the second or third day's start was usually set at 3 or 4 o'clock. The traveler would be having a bit of sleep when a pounding came on the door an hour before and out he was hustled. By the light of a lantern he was told, not requested, to help hitch up and pile in the baggage. Then it was off before breakfast.

Coach Traveling Often Parlous

In those days there were no lights along the way. The traveler was bounced and jounced through darkness and if a woman, she prayed for a safe arrival, for at times a driver would take a wee nip too much to ward off the chilliness of the morning, and then tried to show his skill in handing horses at speed. Sometimes the results were disastrous. When it rained or snowed and there were no covered vehicles the passengers had to make the best of it which was anything but comfortable. Moreover, the highways then were not boulevards and sometimes a stage got stuck in the mud. Then it would be all hands out to help get it out of the mire. Glidden tourists of past years can appreciate what pleasures the travelers of more than a century ago enjoyed. And there was no dodging either. Once when passengers refused to get out and help the driver on a rainy day, he calmly sat beside the road until one of the passengers asked him how long he intended to stay there. He answered that he intended to stick where he was until the sun came out and dried up the mud. The passengers jumped out and "put their shoulders to the wheel" in real earnest.

Josiah Quincy made a trip in his youth that left a lasting impression upon him for he wrote about it as follows: "I set out from Boston on the line of stage lately established by an enterprising Yankee named Pease, which at that day was considered a method of transportation of wonderful expedition. The carriages were old and shackling, and much of the harness was made of old ropes. One pair of horses carried the stages 18 miles. We generally



WITH THE STAGE COACH GREW UP INNS AND TAVERNS ALONG THE ROUTE

reached our resting place for the night at 10 o'clock, if nothing happened, with a notice that we should be called at 3 the next morning. Then, whether it rained or snowed, the traveler must rise and make ready by the help of a horn lantern and a farthing candle, and proceed on his way over bad roads, sometimes with a driver showing no doubtful symptoms of drunkenness, which good-natured passengers never failed to improve at every stopping place by urging upon him another glass of toddy."

Turnpike Roads Not Popular

The turnpike roads were not popular and the drivers who were able to beat the gate boasted of their prowess and were made heroes of by the people. Moreover, many people would go on the old road even though longer and traveling along would jibe at the users of the turnpike. The toll keeper was regarded as fair sport of the young bloods who would dash up and then after making a pretense of paying, swing around and dash away again.

Then came another century, the twentieth, and the dawn of a new era of speed. It brought the motor car into being and once more the old highway became thronged again; once more the inns began to show new life. The sleeping awakened and greeted the new mechanical creations undreamed of by our forefathers. The new century was but a year old when talk was made of an endurance run from New York to Boston in motor vehicles and in 1902 it became a reality. Some sixty starters followed the route from New York to Boston and covered the distance in 13 hours 40 minutes. Later on Harry Fosdick created a stir when he drove from Boston to New York in 11 hours 43 minutes actual time and 13 hours 30 minutes total. This time has been bettered since then. In the 1905 Glidden tour the writer rode with E. A. Gilmore in a Rambler and made the run from Hartford to Boston, which took the first stage coaches 3 and 4 days, in 5 hours. A modern high-powered car could do it in 4 hours now, and the trip to New York that started Monday morning and ended Saturday night could begin Monday morning and end Monday afternoon or evening early.

Franklin Measures Route

The distance between the two cities had been lessened from time to time so that from an original trip of 254 miles it has been shortened to 210 miles. Along the way one may find today milestones telling the distance from place to place. These milestones recall the fact that the great Benjamin Franklin, when postmaster, decided to place these stones and so rigged up a contrivance on the wheels of a chaise that registered distance somewhat like the odometer does today, and with a gang of workers following him, he measured off the miles and had the stones erected. There were real signboards in those days, too, and not a lot of unsightly marks at some crossroads.

With the first decade of the new century passed, the Old Post road is a vastly different one from what it was 300 years ago. Massachusetts, Connecticut and New York have spent millions on it for improvements. The Indian trails gave way to wider paths; the wider paths to real roads eventuating in state highways. The one house, nestling like a last remnant of snow clinging to a mountain peak in spring, has given way to hamlets; the hamlets have been built up into villages; the villages into towns and the towns into prosperous cities. And out of some of these cities along the Old Post road have come the modern vehicle for conveyance along this and other highways.

So in summer now it is nothing exceptional to see thousands of these cars sweeping along between New York and Boston,

scattering wealth as the occupants drink in the splendid air of the valleys and streams in one section and the salt water from Long Island sound in the other while the picturesque panorama spread out before them is a feast intellectual. Last summer at least 120,000 motor cars, carrying probably 350,000 tourists, at least 25 per cent of whom resided outside of New England, used this highway. The 120,000 motor cars represented approximately 10 per cent of all the motor vehicles in use in the United States at the beginning of the 1913 season.

If the old post riders, the stage drivers, the locomotive engineers, the tavern keepers and the travelers of the past generations could only see the wonderful transformation wrought by Time's alchemist, they would shrink back in surprise and astonishment at the whirling panorama.

New Home for Massachusetts Club

Building Represents Investment of \$500,000

BOSTON, Mass., March 10—The Massachusetts Automobile Club, the first motor club in America to own its own home, has just taken possession of its new house at the corner of Clarendon and Stuart streets, Boston, which represents a total cost of \$500,000. And this sum is all carried by the members who subscribed for shares of stock covering the cost. The club has a membership limit of 400 and that number has been reached now. The new club was dedicated in January and there were about 800 present. It is possible to garage at least 400 cars in the building and it is one of the finest structures in the country. Everything modern to prevent damage from fire has been installed. The structure is as near fireproof as modern engineering skill can make it.

Description of the Building

The location is one that is bound to increase in value, as Stuart street will be continued through to Dartmouth street which is regarded as one of the most used thoroughfares in the city. The building stands on a lot 120 feet on Stuart street and 150 feet on Clarendon that gives a land area of 18,000 square feet, and a total floor area of about 140,000 square feet. By use of a new form of construction, that of a flat reinforced concrete column, it has been possible to get seven floors and a basement in the building that ordinarily would have had but six floors. This was possible because the beams are not of the ordinary width, yet they are as strong, if not stronger than the type used in some other edifices. The construction, combining steel and concrete columns, with brick walls is designed to allow for 150 pounds per square foot overland.

The seven floors have plenty light throughout the day, and the artificial light at night makes each floor very bright. This was one of the features the committee

spent much time upon, and to further prepare for any contingency in future whereby the club might have to generate its own current for lighting and other purposes, the contractors were ordered to build into the foundations the required facilities for the installation of a lighting plant. Another similar contingency is cared for by the sinking of an artesian well 498 feet deep that gives a barrel of water a minute.

All but the top floor will be given over to the garaging of cars. There is plenty room so that machines may enter and leave quickly, and the cars when in place will face each other. The congestion that was one of the serious drawbacks in the old club since larger cars, and more of them were cared for has been eliminated. Large sliding doors operated by electric motors allow the cars to be driven in or out at two entrances. At each entrance a man will be stationed and his duty will be to check every car in and out according to the garage law. At the corner of Stuart and Clarendon streets is the main entrance for members, while drivers and workmen use another one at the southwesterly corner.

There is a general office for information at the members' entrance. In this office is installed an annunciator with novel features. It contains hundreds of numbers and each one represents some person, many of them chauffeurs. By pressing a button it will register the individual's presence or absence from the building. In this way it will not be necessary to telephone from one part of the building to another to learn if some one is in or out. This annunciator will be connected with the booths at the entrances and exits, and it will be the work of the employees there to manipulate the annunciator buttons so the chauffeur will not have anything to do with this checking system.

The office of the superintendent, the tele-

phone operators, and an oil and gasoline room are located on the street floor. This oil room is piped to a room in the basement where there are twelve tanks, each capable of holding two barrels. The club supplies its members with several brands of oil, among them the well known Massachusetts Automobile Club brand, made especially for the club. Other accessories are available also. Two underground gasoline tanks buried outside the building have a capacity for 1,000 gallons each, and they are piped to the supply room. In the main office is a master clock connected with others all about the building so that the correct time will be available everywhere.

There are three freight elevators and one passenger all in the rear of the building. The freight elevators are 20 by 8 feet and are ample to care for the cars even when there is a rush on. Storage for cars is provided on the first floor, but not to such an extent as upon some of the upper ones. On the second floor quarters have been arranged for the members fronting on Stuart street. They are large and comfortable. There is a room for meetings by the various committees and officers of the organization. Another room is arranged for the clerical force.

On the third floor will be located the quarters for the chaffeurs. This is on the westerly side and it is divided into two rooms. One room will be equipped with pool tables, and arrangements for checkers and other similar games, also for general resting purposes. A smaller room will be used for reading, or spending the night if a driver is kept out until a very late hour. The remainder will be devoted to the storage of cars.

On the three next floors the entire space will be given over to garaging of the cars. On each of these six floors there are washstands where four machines may be cleaned at once. There are also automatic devices for pumping up tires, etc. The entire seventh floor is given over to a repair shop. It is divided off into various compartments. The larger space will be for the repair work; another for parts, and a third as a motor room. Special vents take the gasoline through blowers to the air, and the skylight is so arranged that in case of fire and explosion—a remote possibility—it would blow off easily.

UP-TO-MINUTE ROUTE INFORMATION

Denver, Colo., March 4.—A unique and valuable system of gathering accurate information daily concerning weather and road conditions over an extensive territory and furnishing same to motorists contemplating trips is being operated by the Denver Motor Club. The plan is working out with excellent success, and is claimed to be the most complete in the country. In fact, the Denver club goes so far as to claim one feature of exceptional benefit not found in the road-information arrangements of any other motor club.

This feature is the service furnished by the Mountain States Telephone Co., which gratuitously turns over to the club every day the latest road and weather data reported to the company's main office by representatives throughout Colorado, Wyoming, New Mexico and parts of Utah and other states in this section of the country. This arrangement makes it possible to learn conditions throughout this wide territory at any time of day or night, and is of great value to tourists, persons having urgent calls for trips when road conditions are doubtful and to the motoring public in general.

This telephone service is supplemented by a plan of giving out self-addressed postal cards to motorists starting out on trips, and having these filled out to cover special stretches of road. Dealers and others are also asked to furnish any special information they may happen to get. Thus it is easy to keep reliable and up-to-the-minute information regarding conditions in general, and also regarding particular stretches of road in bad condition, bridges needing repair, etc. All calls

for repairing dangerous points due to defective bridges, washouts, etc., are immediately reported to the state highway commission and the respective county commissioners and road overseers, who have been co-operating favorably toward improvements of all kinds.

The information concerning the general road conditions is posted daily at the club's headquarters on a blackboard map of Colorado and neighboring states, where a simple code of marking indicates whether a road is good, fair, muddy, poor or impassable.

NAME GRAND PRIX DRIVERS

Paris, Feb. 25.—The drivers for the Fiat and Vauxhall cars entered in the French grand prix to be run at Lyons July 4 have just been announced. The Fiat team will be composed of Cagno, Fagnano and Scales. It was announced originally that Louis Wagner would be at the wheel of one of the Italian cars but he is not named by the maker. The Vauxhall drivers for the grand prix are Hancock, Watson and Munro.

American Cars Show in Swedish Test

Reliability Honors for Yankee Makers

STOCKHOLM, Feb. 25.—The annual Swedish winter reliability trials, promoted by the Royal Swedish Automobile Club, were declared completed today by the judges who awarded the honors of the competition to Hans Osterman's 18-horse-power Minerva, the only car out of sixty-two starters and twenty finishers to escape penalization in what is said to be the most strenuous test for machine and driver ever held in Europe because of the wretched condition of the roads at this time of the year.

Six American cars completed the run. In class I, a Hupmobile was awarded fourth place, receiving 43½ black marks. A Cadillac was ninth, an Overland eleventh and a Chandler fourteenth. Of the four entries in class II to finish, a Studebaker placed second and a Krit fourth. In addition the Cadillac made the fastest time in the hill-climb of any car in its class. It is a 1914 model, rated at 20-30 horsepower and equipped with a two-speed rear axle which doubtlessly assisted in the gaining of this event.

The victory of Osterman and the Minerva is a repeat triumph as they were awarded first place in last year's trials. Also in 1912, Osterman was one of the seven drivers to finish without receiving a penalty.

The event attracted a large number of American entries, twenty-two of the sixty-two starters hailing from the United States. Uncle Sam was represented by the following: A Herreshoff, four Cadillacs, a Hudson, a Ford, a Paige, four Overlands, two Hupmobiles, a Chandler, an Oakland,


two Studebakers, three Krits and a Richmond.

The course for the trials—from Stockholm to Gothenburg and return by a different route—made a run of 795 miles, approximately 60 miles more than last year. The rules permitted a maximum speed of 18 miles an hour in the daytime and 12 miles an hour after dark. Outside of Gothenburg there were six controls where the rules provided for a stop of 15 minutes at each.

According to the drivers, the roads were indescribable. A month ago Sweden was one great mass of snow but 3 weeks ago mild weather set in and it started to thaw and rain. As a result, the highways are bogs, more fitted for travel in a hydroplane than by motor car. Some of the cars sank so deep in the mire that it took as many as six horses to pull them out.

The list of the cars that finished the rigorous test and their penalizations follows:

CLASS I		
Position	Car and driver	Penalization
1	Minerva, Osterman	0
2	Horch, Raaf	33
3	Horch, Paulmann	36
4	Hupmobile, Hogman	43½
5	Fiat, Brambeck	48
6	Minerva, Enderlein	59
7	Opel, Eklund	67
8	Dessauer, Larsson	90
9	Cadillac, DeMare	103
10	Adler, Hageselle	211
11	Overland, Holmer	275
12	Adler, Nelson	323
13	Horch, Stiernsward	537
14	Chandler, Nervo	692
15	Scania-Vabis, Backdahl	2554
16	Napier, Lindstrom	5593
CLASS II		
1	N. A. G.-Darling, Karlsson	60
2	Studebaker, Goeringer	83
3	Stoewer, Stamm	174
4	Krit, Djursson	1068



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Have the A. A. A. Do It

THE American Automobile Association has demonstrated to the entire satisfaction of all its ability to control motor contests such as track racing, road racing, hill climbs, economy tests, and the varied forms of reliability contests and tours. The association has stood as a practical guarantee that prizes offered would be distributed to drivers, and entrants in the majority of cases demanding that cash prizes be posted with the official representative of the A. A. A. in advance of the start of the contest. This is good work. It should be continued. But to go further:

ONE other aspect of contests in which the governing body should step in is that of regulating prize money offered to winning cars and drivers in different contests by accessory concerns whose particular accessory may or may not be carried on the winning car. Our attention has been drawn during the past week to drivers who have sent letters and telegrams stating that they used a certain make of spark plug, or a certain grade of cylinder oil in their car in order that they might get the cash prize offered by the makers of these respective accessories, whereas the true facts disclosed that the car in question did not use the make of spark plug stated and did not use the grade of oil which the driver announced. Without a doubt the driver deliberately misstated the facts in order to get the money posted.

THIS is but one case of this nature. There have been many others. The prize money offered has looked better to the drivers than their honesty. Some drivers have not stooped to these low levels of dishonesty but others have.

IT is up to the American Automobile Association to stop this dishonest factor in connection with contests. It will not be a difficult job. Let the governing body make it mandatory that accessory concerns giving money in the form of cash

prizes to winning cars using their accessories, deposit such money with the contest board, its official representative, or the referee of the contest previous to the contest. Further, require that the technical committee of the contest issue an official report covering those accessories, lubricants, etc., for which money is offered. Make it imperative that this committee check these various parts over immediately preceding the race as well as immediately after same. This done, have an official report issued by the committee and signed by same as to the different winning accessories, etc. A step in this direction was taken at Santa Monica, where the technical committee carefully checked up on these points.

IT should be valuable to every accessory manufacturer to be officially acquainted with the fact, whether his accessory wins or not. It also is of value to the public at large made up of buyers of accessories that they know make good in contests of this nature. Let the official report be a part of the complete official returns of the contest, and as to whether this report includes only the names of those accessories in connection with which a cash deposit has been made, or to include all accessories whether connected with a deposit or not, is a matter in which the contest board and promoters can work out for the best interests of the industry.

IT is just as important that an honest report be issued in connection with accessories, lubricants, tires, etc., as in connection with the car or the driver. Such reports will add a new factor of interest to contests. It would be of particular value to know officially how many spark plugs and of what make were changed in the last 500-mile speedway race, in the Elgin road races, and in the recent Santa Monica races. Let the contest board take the matter in hand, take it up with the accessory people, take it up with the promoters, and take it up with the individual drivers and make a success of it.

Romance of Petroleum

GASOLINE promises to remain one of the chief if not the foremost source of energy in the propulsion of motor-driven vehicles for many years to come, in spite of the dire prophecies of its rapid extinction and the threatened inroads of cheaper fuels. Of the proposed substitutes several, kerosene, motor spirits, toppings and others, come from the same source as does gasoline. To the average motorist petroleum means simply the raw form of gasoline and cylinder oils; very few realize the importance of its other products to humanity as a whole.

ONE writer, in commenting upon the general ignorance of the value of petroleum and its products in the arts and industries, says that "If 100 people were asked to name the most valuable of all the riches taken from the earth, few indeed would be the answers giving petroleum an important place. Yet, coal and iron excepted, no other mineral product can rival petroleum in real value to all the peoples of the earth, without regard to class."

MOTORISTS themselves are indebted to petroleum to a far greater extent than would be imagined at first thought. Not only do they depend on its products for fuel for engine and lamps, but the actual construction of the car involves the use of petroleum products. Ligroin, one of the lightest of the petroleum distillates, is used in the manufacture of tires; paraffin, petroleum wax, insulates the ignition coils; benzine goes into the manufacture of the varnishes for the body; even the roads offer a field for the use of petroleum products. Among these are road materials and binders under the names of asphalt, bitumen, road tar etc., as well as the heavy oils employed as macadam binders and dust layers being employed.

THERE is a romance in the history of petroleum and its products. Its formation began aeons ago, probably before human life even was possible on this planet; it made its first appearance as lakes of pitch or as vast seas of burning oil, ignited by some prehistoric Prometheus to become an object of reverence by the fire worshippers.

Court Decision Alarms Dealers in Wisconsin

Employer Held Liable for Accident to Chauffeur

MILWAUKEE, Wis., March 9—Wisconsin motor car dealers and garagemen have just come to a sudden realization of their responsibility under the Wisconsin industrial insurance act or workmen's compensation law by the action of the Wisconsin industrial commission in requiring the Janesville Motor Co., of Janesville, Wis., to pay \$2,740.43 to the widow of Forest E. Gower, a chauffeur for the Janesville company, who was killed in an accident a short time ago. The order says the payment must be made at once and in a lump sum.

Gower was employed as a chauffeur and had taken a passenger from Janesville to Beloit, Wis. On his return trip he backed off a culvert, the machine was overturned, pinning him and a companion beneath. The companion escaped without injury but Gower was instantly killed. Under the Wisconsin law the common law defense of contributory negligence is entirely abolished and the employer is required to pay a certain amount for various injuries or the death of an employe while on duty, regardless of whatever degree of negligence on the part of the employe contributed to the injury or death. An employe also is presumed to be on duty practically from the time he steps on the premises of his employer.

The Gower case is of grave importance, as it sets a precedent for all future accidents of this kind and gives employers of chauffeurs or others handling cars very little, if any, chance of escaping payment of heavy damages in case of the death of such employes while on duty, even if the employe is entirely to blame for the accident. It can be understood readily to what extent such negligence or carelessness might be carried in the case of motor car drivers, and the burden upon garagemen and dealers might be almost unlimited.

The Wisconsin workmen's compensation act is declared to be probably the most progressive and advanced legislation of this character in the United States and while it means a hardship on garagemen in some instances, it is generally accepted in a favorable light, inasmuch as it must necessarily be a broad measure which cannot exempt certain classes. The law is, naturally, seeking to protect the workman and at the same time insure the employer a square deal in the matter of collection of damages. The law has made it profitable for employers to throw safeguards around their employes and it is therefore up to the garagemen and employers of drivers and chauffeurs to use their best efforts toward the prevention of accidents.

DECISION AGAINST AGENT

Portland, Ore., March 4—A decree of \$8,000 damages against the Howard Auto-

mobile Co. of Portland, awarded by a jury for personal injuries as the result of a motor car accident, was affirmed by the supreme court at Salem, Ore., March 3, Justice Eakin writing the opinion.

John F. Holmboe, the plaintiff, was injured in Portland, being run down by a machine operated by W. H. H. Morgan, who was negotiating with the Howard Automobile Co. for the purchase of the car. One of the stipulations in the contract for the sale of the car was that the company would teach Morgan how to operate it. While riding with a demonstrator he was allowed to take the wheel and the accident resulted.

DENIES A. A. A. LOBBY

New York, March 11—Special telegram—President John A. Wilson of the American Automobile Association, in a statement issued today, denies that his association has maintained a lobby in Washing-



Obituary

FREDERICK J. NEWMAN, president of the Chicago Electric Car Co., died at his residence in Chicago, March 7. Mr. Newman entered the motor car industry in 1899 as chief draughtsman for the Fisher Mfg. Co. with which O. E. Woods, of electric vehicle fame, was connected. The perfection of a number of electric motor and controller patents which were taken up by the Westinghouse Electric and Mfg. Co., brought Mr. Newman to that concern in 1900. After the reorganization of the Woods Vehicle Co. in 1902, Mr. Newman left the Westinghouse company and became chief engineer of the Woods company. He remained with that concern until the summer of 1912 and left to take charge of the Chicago Electric Car Co., then organized. Mr. Newman's death leaves the concern without a president and according to Mr. Reid, the agent in Chicago for Chicago electrics, the office will remain vacant temporarily.

DAVID B. SMITH, one of the oldest and best known salesmen in the bicycle and motor car sundries field, died very suddenly at his home in Stoneham, Mass., on Friday, March 6. Mr. Smith represented the Standard company, of Torrington, Conn., and the Splittdorf Electrical Co., of Newark, N. J.

ELIAS ZIMMERMAN, president of the Zimmerman Mfg. Co., Auburn, Ind., died at his home in that city, aged 85 years. Mr. Zimmerman was born in Fayette county, Pa., in 1829, and came to Indiana from Ohio in 1844. He became interested in the planing mill of his son Frank, in 1875, which afterwards became the Zimmerman Mfg. Co.

ton for the purpose of pushing his good roads measure, as intimated by Congressman Shackleford in the House of Representatives on February 24. President Wilson states that his association represents the road wishes of its membership, and that in all its various road congresses it has invited Congressman Shackleford to state his views, and further, that the general objection to the Shackleford road plan is the untenable road rental system that he champions.

MAKERS DISCUSS LEGISLATION

New York, March 7—The National Automobile Chamber of Commerce has decided to put its finger in the legislative pie. At the meeting of its directors last Thursday it was decided that there has been so much legislation proposed in the various states, some unfair and of a nature that would create hardship among the million or more users of motor cars, that it was time to declare a policy that will discourage by all proper means the enactment in any state or legislative jurisdiction in this country of any legislation that falls within the following classes:

1—Bills which impose local license or registration fees or local regulations upon motor cars or their owners or which give authority to minor jurisdictions to regulate the operation of motor cars; such license or registration fees and regulations being in addition to those imposed or fixed by state laws.

2—Discriminatory bills which impose burdens upon motor cars not borne correspondingly by horse-drawn vehicles.

3—Bills, the effect of which is to impose double taxation on motor cars through the imposition of a personal property tax in addition to the exaction of registration and license fees, or otherwise.

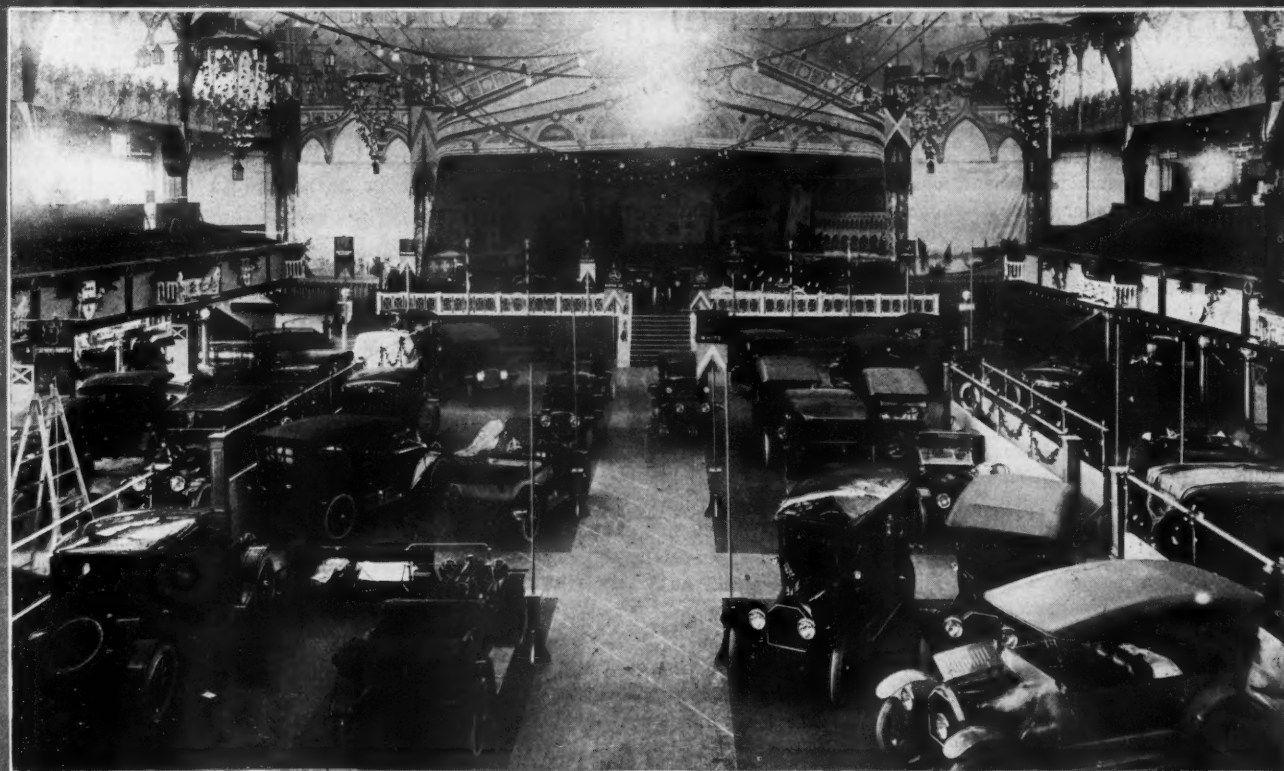
4—All acts imposing an occupation tax on either agents or manufacturers of motor cars or restricting or regulating the industry or the trade by special legislation.

5—All legislation requiring the use of specific or proprietary devices or attachments on motor cars in addition to manufacturers' standard equipment.

MILES OUT; REEVES IN

New York, March 7—After 14 years of association work, Samuel A. Miles has retired, his resignation as general manager of the National Automobile Chamber of Commerce being accepted at Thursday's meeting of the directors. Alfred Reeves, formerly manager of the Association of Licensed Automobile Manufacturers, and who recently was vice-president and general manager of the Hartford Suspension Co., succeeds Mr. Miles.

Mr. Miles, however, will not be lost to the motor industry. It is his intention to devote his entire attention to the management of the Chicago and New York shows and to other personal interests. At the meeting which accepted his resignation, Mr. Miles reported for the show committee, declaring that the recent national exhibitions were the most successful in the history of the industry.



VIEW DOWN THE CENTER AISLE OF THE GRAND HALL, BOSTON SHOW, WHICH IS DECORATED THROUGHOUT ALONG VENETIAN LINES

Boston's Twelfth Annual Show of National Caliber

Ninety Different Makes of Cars Displayed for a Total of 287 Machines and Chassis—Decorations of the Highest Order—Trade Situation in New England

BOSTON, Mass., March 7—New England's twelfth annual Boston show, which opened here this even and which will hold the boards for a week, once more established its right to be known as the premier motor car dealers' show in America, as well as an exhibition of cars which not only rivals, but surpasses in point of numbers the national exhibitions held in January in New York and Chicago. Boston tonight boasts of eighty-nine different makes of gasoline and electric passenger cars on exhibition. Add to this one steam builder and you have the grand total of ninety, a figure that means much to Bostonians, who have fought for their show since its inception.

Boston Show a Big One

Compared with the recent New York show with eighty-two different makes of cars exhibited and with eight-seven makes exhibited in Chicago, Boston does play up to advantage, particularly when you remember that the show is a dealers' show, with only Boston dealers making the exhibits.

An official count made by a Motor Age representative tonight showed a total of 287 cars and chassis on the floor—twenty-

By David Beecroft

seven of these being chassis and 260 complete cars, the majority gasoline cars of all types, about a dozen electrics, nearly an equal number of cyclecars or small cars and a group of steamers.

But while Boston boasts of its high-water mark, as regards the number of exhibitors and the number of cars displayed, it still falls far short of being an exhibit of all American makes, since there are over three score and ten different makes of American gasoline cars and many makes of electrics not on exhibition. Boston has few cars not previously seen this year at either New York or Chicago, two of these being the Lenox, of local manufacture, and the Moyer. The Stanley steamer, manufactured in the outskirts of Boston was not exhibited at other shows but is seen here.

Foreign cars have a small representation, Renault and Fiat being the only exhibitors. One year ago the American importers held a salon in the grand ball room of the Copley Plaza hotel, but the failure to effect satisfactory arrangements for such a display this year, left Boston with

a smaller representation of imported cars than for some years.

From an accessory point of view the show is largely a local one, in that this is the first year that the Motor and Accessory Association, the national accessory organization of America, has not been a party to the show. Consequently none of its members is exhibiting. Whatever accessories are shown are displayed by local dealers and the majority are small devices and tools, many local supply companies being included in the list. Few of the leading makes of tires are seen, there are half a dozen different makes of carbureters; one or two magnetos, and a good exhibit of gasoline storage systems, oils and greases, motorcycles and factory and garage machinery, the latter being in the basement where multiple drills, broaching machines, grinders and a host of other factory machines are seen in operation.

The Decoration Feature

Boston has always boasted of its decorations and as usual has right to high honors in this respect, for the decorative feature is a suitable one and is well balanced throughout the maze of buildings and rooms that house the cars and accessories.

Before attempting to describe the scheme keep in mind that the Mechanic's building, in which the show is held, is a rightangle triangle with a long base and a perpendicular about one-half as long. This building is in reality two, although to all intents and purposes one. It is two in that about one-third of one end is cut off and forms what is called the Grand hall, which is separated from the remainder by a thick wall with suitable doors leading through. The other hall is known as Exhibition hall.

This triangular building is a three-story one with a basement, a main floor and some second floor and gallery spaces. The entire main floor is given over to cars; the basement is half cars and the remainder motorcycles, accessories and machinery; and the balconies and second floor are accessories and a few cars.

Details of Decorations

The decorative scheme is Italian. The Grand hall is Venetian and the Exhibition hall Roman. Grand hall is a huge rectangle with a stage at one end and a gallery around three sides. The Venetian scheme is worked out by the entire stage setting, being a Venetian building scene. At one end of the hall is the Grand canal, Venice, with its buildings along each side of it, in miniature. Along the face of the gallery are small Venetian balconies filled with flowers. From the ceiling are suspended huge chandeliers festooned with ropes of varied-colored lights. The entire effect is a pleasing one.

In Exhibition hall, the Roman scheme of decoration consists of entablatures in the Roman style which conceal the massive beams supporting the ceiling. Masking pieces cover the pillars and the walls are decorated with large paintings of motor scenes. At the corner of each exhibit space are plain Roman pillars with an illumined frosted globe on top, the globe carrying the name of the exhibit. Overhead festoons of colored lights add to the general effect.

In the basement and on the second floor little effort has been expended outside of endeavoring to cover the pillars and girders with bunting.

The car exhibits are interesting but do not average as good as those seen either at New York or Chicago in that there are not so many show cars present and the colors are more somber with the exception of Peerless, which is on hand with its green Longchamps berline; Fiat with a large display of models; and Buick with an exhibit space made interesting by brilliant cars, one mounted on a revolving turntable, another surrounded by a brass railing, and a chassis enclosed in brass railing. Overhead, special lighting equipment has been imported from the local salesroom that adds very materially to the effect of the exhibit space.

Boston has always been renowned for its large exhibits of cars and this year is no exception. Chalmers shows six cars and a chassis; Buick has seven cars and a

chassis; Fiat has five and a chassis; Packard and Cadillac, side by side on the stage in grand hall, each show six cars and a chassis; White has seven cars in its space on the main floor in the grand hall and four in an overflow space in the basement, giving it the show record of eleven; Pierce-Arrow shows seven and a chassis; Locomobile shows six and a chassis; Peerless and Winton show six cars each; and Regal shows seven cars in its basement space. If necessary the Boston dealers could reduce the size of exhibit spaces and increase the number of exhibitors to over one hundred.

There are fewer chassis seen than a year ago, this trend being the same as noted at both New York and Chicago, but where the lecture method is employed around the cut-away chassis, there the crowds are also. In one stand this evening the lecturer had forty-two interested listeners, grouped around the chassis and in an adjoining space with cars only shown, there were only two visitors. Truly, even in staid New England, the mechanics of the car have more charms for the masses than the body lines. The body design does its part but people have studied these lines during the 4 or 5 months the cars have been seen on the streets and so unless some new color scheme is worked out, the body interest is short-lived so far as the show is concerned.

Opening Attendance Large

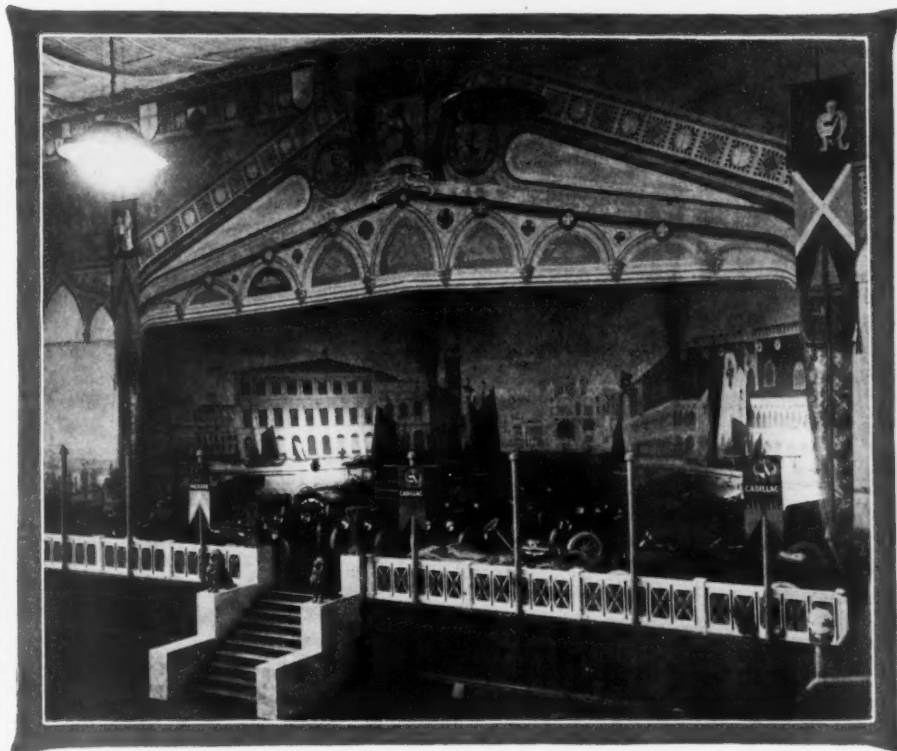
Tonight's attendance was most encouraging as in former years. It was a paper crowd, the dealers having distributed complimentary tickets very liberally. Even Boston seems to overdo this custom and

much money is wasted. Dealers are buying these tickets in large quantities at 25 cents each and mailing them to prospects. One banker told of receiving passes from ten different dealers. Some dealers are endeavoring to discourage the practice but still it lives and grows.

Many Dealers Expected

That there will be the usual attendance of dealers from all six of the New England states at the show during the week is assured. These dealers have all been invited and when they arrive will find season passes awaiting them, provided they can satisfy the show management of their bona fide status as dealers. These New England dealers make show week the occasion of their annual visit to the Hub. With them will come over 50 per cent of the New England population that is capable of buying medium and high-priced cars, because New England has few local shows. Maine has two local shows at Portland and Bangor; Vermont is without its local show; New Hampshire does not boast of a show; Rhode Island has its Providence show; there is also a show at Hartford, but no others, so that buyers are compelled to come to Boston to be assured of seeing all of the cars.

This is why Boston has always had a great dealers show, and while finances have been bad during the past year owing to losses connected with the New Haven and Boston and Maine railroads as well as due to strikes and other troubles with the textile factories, the dealers are looking forward to a good revival of trade. Business began opening up a month ago, it is improving right along and if the snow were

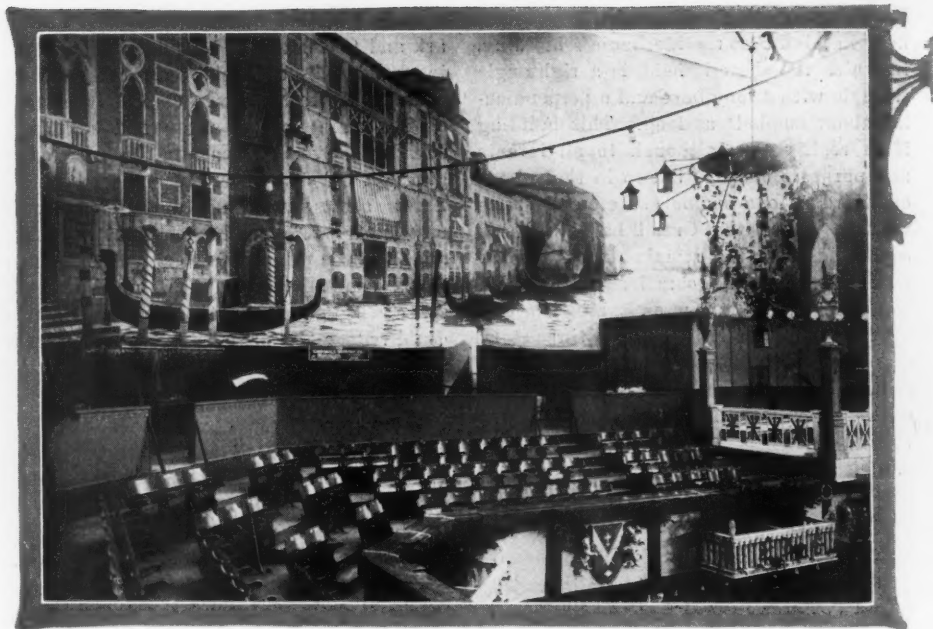


PROSCENIUM AISLE IN GRAND HALL, BOSTON SHOW, WITH VENICE AND ST. MARK'S IN THE BACKGROUND

to go, there would be a very general improvement.

Unfortunately New England is badly distracted with the trading policy in making cars sales. Nearly a dozen dealers today acknowledged that over 75 per cent of their sales are made on trades, and where there are branch houses the valuation on old cars is often so high as to make it nearly impossible for the dealer to compete with them and show a symptom of a profit. As a result of this there are too many changes among Boston and New England dealers. Each year brings its tidal wave of new agencies, an agent tiring of one account and changing to another, his performance being but a jump from the frying pan into the fire. In a word, motor car merchandising in New England is not on as high a standard as it should be.

However, the dealers here are most optimistic as to the future and it is believed that 1914 will be a banner year among the agencies in Boston.



PORTION OF DECORATIVE PIECE AT BOSTON SHOWING GRAND CANAL OF VENICE IN GRAND HALL

New Ideas in the Accessory Line Displayed at Boston

Fox Movable Headlights

THE Fox swinging headlights are so designed that the regular headlights are made use of and swing one at a time. When turning the car toward the right, only the left headlight swings and turning the car to the left, the right lamp swings. The swinging is done automatically from the steering wheel by means of a locking device which is locked only when the lights are used and unlocked during the day, leaving the lights stationary.

The swinging is all done by steel cables which pass through seamless steel tubes from the base of the steering column to the base of the lights. Mounted over the steering column above the toe-board is a movable sleeve with right- and left-hand threads and over these threads pass the steel cables. At their opposite ends these cables attach to short screw threads on the base of the lamp pillar and in the lamp are springs to hold the lamp normally in the forward position, so that when swung to the side by the cable, the spring is tightened and immediately brings the

lamp back to the straight position when the cable is released.

Shimpf Air Starter

A combined air-pump and air-starter is shown by the Shimpf Starter Co., Boston. The device is a four-cylinder pump, with cylinders mounted V fashion, two on each side of the pump shaft. At one time, these cylinders act as an air pump and store air

in a tank 48 inches long and 8 inches in diameter up to a pressure of 200 pounds; and at other times, when starting, the air is liberated from the tank and goes into the same air pump cylinders, this time making the pistons work and so cranking the gasoline engine. The control by which the cylinders at one time serve as an air pump and at another time as an air engine is simple and automatic. The pump is driven from the engine crankshaft by silent chain and arrangements are such that the pump automatically cuts out when the pressure reaches 200 pounds in the tank. When using the pump as a starter, a dash controls permits of mechanically raising a control valve which admits the air from the tank into the cylinders.

This air-pump starter is made in two sizes, one for motors of 15 to 25 horsepower and the other for motors of 25 to 50 horsepower. They are alike in design and only different in dimensions. The smaller pump-starter has cylinders 1½ by 2 inches and weighs complete, with attachments, 68 pounds. The large pump

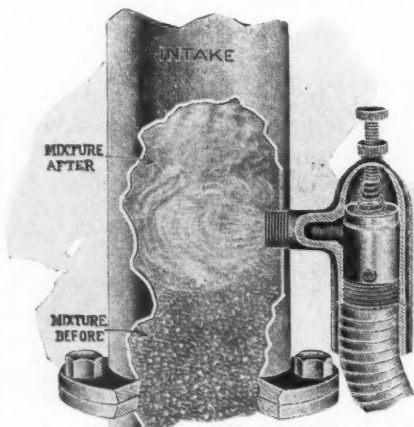


FIG. 1—PEERLESS GASOLINE SAVER

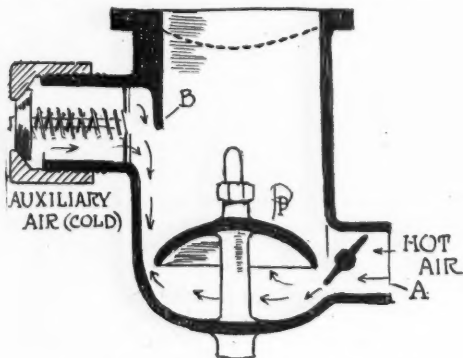


FIG. 2—PRINCIPLE OF AIR SUPPLY IN PARKER CARBURETER.

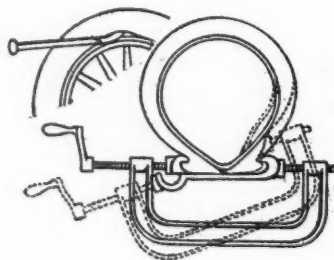


FIG. 3—CALNAN TIRE REMOVER.

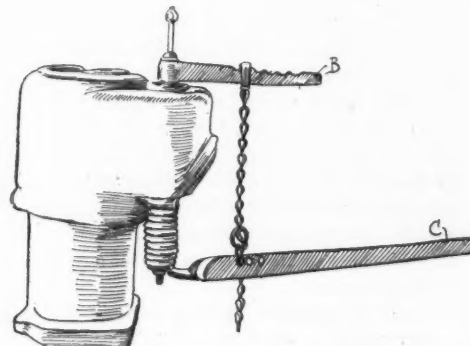


FIG. 4—WINDSOR ADJUSTABLE MOTOR VALVE REMOVER



AMPLE SEATING ACCOMMODATIONS IN GRAND HALL AT BOSTON SHOW

with cylinders, $\frac{5}{8}$ by $2\frac{1}{4}$ weighs complete, 85 pounds. It measures 12 inches long, 8 inches high and $9\frac{3}{4}$ inches wide over all. All of the air drawn into the four pump cylinders enters through the breather pipe into the pump crankcase and the escaping air when the device is used as a starter escapes through the same channel. The pump cylinders are air cooled. Thirty starts are claimed on one tank of air.

Calnan Tire Remover

The Calnan tire tool for both removing and attaching clincher or Q-D tires is illustrated in operation in Fig. 3. The tool resembles the jaws of a vise and in emergencies the tool can be attached to the running board of a car and play this role in repair work. The jaws spread wider than the wheel felloe and rim and when used to remove a tire that has frozen to the rim it is positioned as shown in dotted lines and when used in removing the ring in a Q-D tire is used as shown in full lines in the illustration. The end pieces of the two screws are loose and as one side of them is flat and the other con-

caved these can be reversed according to the work to be done. Accompanying the vise is a curved tool, one end of which is a ball to be used as a hammer and the other end a curved prong to pry the ring out in a Q-D, or to aid in loosening the tire. It is made by James P. Calnan, West Upton, Mass.

Parker Carburetor

In the Parker carburetor, a product of the Parker Carburetor Co., Cambridge, Mass., two devices are made use of to aid in vaporization of the gasoline by heated air. The carburetor has two air inlets, one A, which receives air through a hot air horn from the exhaust manifold and known as the fixed air opening. It is at the base of the instrument. The other air opening is a horizontal one at the top of the carburetor and receives cold air. In

order to heat this cold air a deflecting plate, B, is used to direct the cold air towards the bottom of the carburetor where it strikes underneath an umbrella-shaped baffle plate, P, in the base of the carburetor and surrounding the lower part of the nozzle. This baffle plate is heated normally by hot air entering by way of A and is looked upon to heat the cold air entering through the auxiliary valve. In the top of the carburetor is a screen to prevent back firing and further aid in breaking up gasoline particles. The throttle, not illustrated in Fig. 2, is a butterfly one.

Two-Way Valve Tool

L. D. Robbins Co., Lynn, Mass., has a simple screw-driver type of valve grinding tool, Fig. 6, which can be used for grinding valves which have a slot in their top to receive a screw driver or to grind other valves which have two small holes instead of the slot. In the head of the tool are the two prongs formed in one U piece so that they can be turned into position for use or out of position, allowing the screw-driver part being used. A set-screw holds the prongs in either position.

Lawrence Motor Lock

A new form of electric-mechanical lock for the emergency brake lever of motor cars has been brought out by the Lawrence Specialty Co., Dorchester, Mass. The Lawrence lock is operated electrically but locks mechanically.

In addition to locking the brake, a combination switch with Yale key is used, one-half of this switch locking the magneto by short-circuiting it on itself and the other half of the switch locking the brake. Fig. 8 shows the switch part that goes on the dash and the part B which is the locking portion for the brake. This box, a small metal one, is inserted in the brake connection, becoming a part of the connection. The arm A depends from

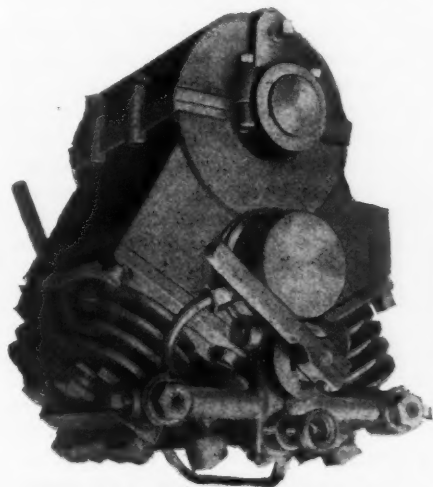


FIG. 5—SHIMPF AIR STARTER

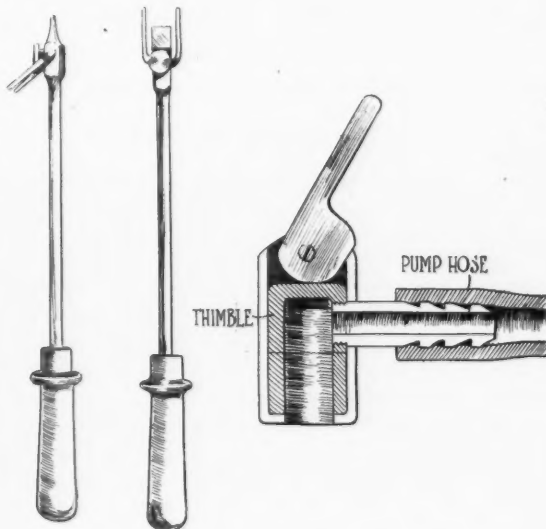
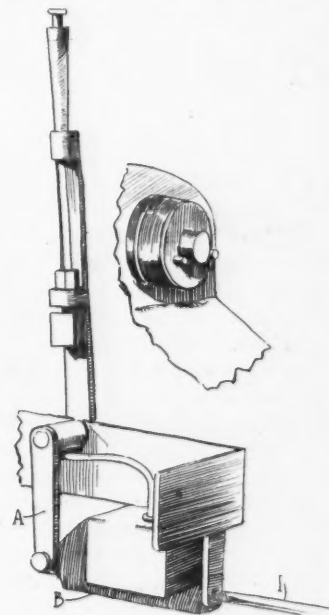


FIG. 6—TWO-WAY VALVE TOOL. FIG. 7—THUMBLOCK HOSE COUPLING. FIG. 8—LAWRENCE MOTOR LOCK



the emergency brake shaft and couples at its lower end with a toothed rack within the box B.

At its rear end this rack is connected with the brake linkage. Into this rack works a locking pawl which is controlled by an electro-magnet, the electro-magneto, in turn, being regulated by the dash switch. When the brakes are applied by pulling the lever back the pawl drops into the rack by gravity and locks the brake, but to unlock the brake electric connection is established, and the electro-magnet lifts the locking pawl out of the rack.

Windsor Valve Removing Tool

The Windsor Mfg. Co., Providence, R. I., markets a tool for removing valves which is a simple double-lever device with a chain connecting between the levers. The top lever carries at its inner end a piece that threads into the spark plug opening and which when threaded still further in rests on the valve head and retains it on its seating. The lower lever has a yoke at its inner end to span the valve stem and rest against the washer on which the valve spring rests. As the length of the vertical chain connecting the levers can be varied, the tool can be adapted to various sizes of motors.

Thumlock Pipe Coupling

The Gurnard Mfg. Co., Beverly, Mass., has a simple coupling for using on the end of the hose on a tire pump so as to immediately couple the hose onto the valve stem without screwing it on. The coupling is a short thimble-shaped piece with a rubber thimble or lining inside it.

On top is a short handle with a cam end that presses on the top of the rubber thimble, so that in use the open end of the thimble is pressed over the valve stem and when the handle is pressed down, it squeezes the rubber thimble so that it presses inwardly against the sides of the

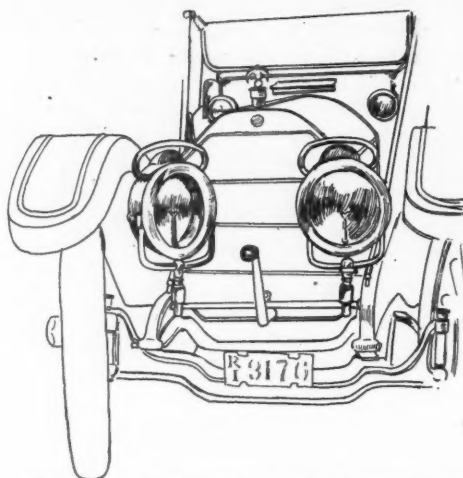


FIG. 10—FOX DIRIGIBLE HEADLIGHTS

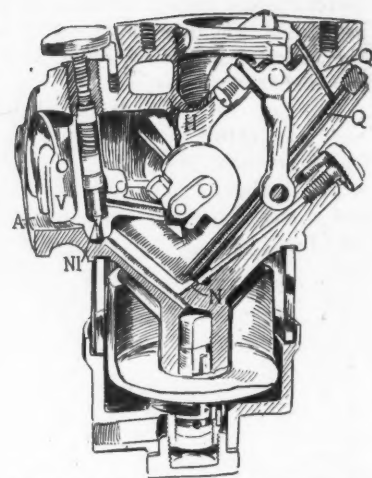


FIG. 9—SECTION OF KENNEDY CARBURETER

valve stem forming what is claimed an air tight joint.

Kennedy Springless Carbureter

The Kennedy carbureter, Fig. 9, manufactured by L. D. Robbins, Lynn, Mass., possesses several characteristic features. All of the air enters by the one opening, A, which is guarded by a flap valve, V, which is weighted at its bottom so as to hang vertically and has a series of holes bored in its top part. The valve is supposed to give a progressional air opening, in that first the air will all enter through the holes in the top of the valve, but as motor suction increases the valve will swing inwards at the bottom and outwards at the top, until it rests in a horizontal or wide-open position, both the weighted bottom part and the holes in the top part playing respective parts in regulating this opening.

The carbureter has two nozzles, a fixed one, N, and a movable one, NI, which is interconnected with a special air valve, H, in the main air passage to the throttle. There is also a gasoline bypass, Q, which,

when the throttle is closed, allows of gasoline passing direct from the puddle around the main nozzle to the manifold.

The valve H in the mixing chamber is a compound type, or is a valve within a valve, the outer part of the valve carrying a smaller disk-shaped valve within it, so that in case of very sudden openings of the throttle the outer part of this valve opens first, and the inner part later, this again giving a progressional control, not unlike that in the valve regulating the main air supply.

Peerless Gasoline Saver

The Peerless Motor Specialty Co., New York, is marketing a fuel saver which is in the form of an auxiliary hot-air valve which takes its air from around the exhaust pipe and leads it to the mixing chamber of the carbureter. The hot air is sucked into the chamber automatically and the volume of hot air striking the ordinary carbureter mixture is said to thoroughly vaporize it and at the same time apply additional air which the motor requires at the higher speeds.

Hawkeyes Gather at Des Moines to Attend Big Show

Annual Iowan Exhibition Opens Auspiciously

By Bert N. Mills

DES MOINES, Ia., March 9—Des Moines and Iowa interests are centered here this week on account of the fifth annual Des Moines show at the Coliseum. The show started auspiciously this evening with a record crowd for opening night. Dealers and motorists from all sections of the state are here and the Des Moines attendance is larger than in former years. The annual meeting of the Iowa State Automobile Association will be held here March 11 and that event is helping to attract motor and good roads enthusiasts from outside of the city.

A brown and gold color scheme prevails in the decorations. The fixtures which separate the booths are of the mission style and bay trees add a bright touch of color to the quiet effect of the general

color scheme. Gold letters mark the various exhibits and a noiseless covering of soft green carpets the concrete floor. Only the main floor of the building is occupied this year. This cuts down the exhibit space but enhances the beauty of the show. Five large chandeliers and a host of border lights furnish semi-indirect illumination.

Exhibitors this year are fifty in number. This is fewer than last year, when the balconies of the Coliseum were used for exhibit space. There was a demand for much more space than could be given but the dealers believe it best to keep the show to the main floor and avoid the old plan of balcony exhibits.

New methods of handling the show are in vogue this year. One of the innovations is the absolute abolishing of noise. No gasoline is allowed in the cars and all horns are barred. The very floors of the Coliseum are noiseless. Several features are employed to attract buyers. One is society night, when all of the dealers and their employees must appear in evening clothes. Another is a night for the merchants of the city. It is estimated that the attendance this week will reach 30,000 and that many cars will be sold at the show.

Des Moines dealers and distributors say that the show demonstrates the sure position of this city as one of the largest distributing points in the west. Dean Schooler, president, and C. G. Van Vliet,

secretary, are officers of the local dealers' association who give the following facts on the importance of Des Moines as a motor car distributing center:

Half of the Des Moines distributors have the entire state as their territory. The other half have all of central Iowa, which is about half the area of the state and a most productive territory from the car distributing standpoint. This territory includes Des Moines, Marshalltown, Ames, Grinnell, Newton, Colfax, Indianola, Winterset, Guthrie Center, Adel and a score of other important Iowa cities.

Des Moines has a total of thirty-six dealers and they sell fifty-six different makes of cars. Five of the dealers sell electric cars of various types and twelve handle trucks. There are four big supply houses which all are doing a state-wide business and the total number of garages in the city is well over half a hundred.

Dealers and distributors here expect to place 5,000 new cars of all types in Iowa this year. They already have placed orders for one-third of that number and in view of generally excellent crop and industrial conditions the prospects are excellent for the fulfillment of their expectations.

Crops and good roads are the factors that are most important in determining market conditions for the motor car in Iowa. When Iowa has good crops, and she almost always does, Iowans have money. The farmer gets in first and he proceeds to distribute it to the general populace. Not a few of his millions find their way eventually to the coffers of the motor car manufacturer. Many of these dollars go direct from the farmer to the car salesman. Iowa farmers are motor and good roads enthusiasts.

Iowa's crops bid fair to be of the bumper variety this year. The winter wheat is coming out of the winter in good shape and the soil is in unusually good shape for early spring planting. Fall plowing continued this year into January and much of the ground now is ready for planting.

The good roads movement is more than ever alive in the state and the year promises greater road improvements than ever before. All of the fifty-eight organized highways of the state are busy on plans for big betterments and the new state highway commission promises to double its good work of last year. Permanent bridges are to replace wooden structures on most of the main county highways of the state and the River-to-River road has already started to work for public sentiment in favor of county bond issues for the building of permanent roads. The state highway commission is working on permanent grades for many of the principal cross-state roads and these will be ready for permanent surfacing if the necessary laws are enacted by the next legislature, which will be in session a year from now.

Central Iowa was, of course, the best market for the Des Moines distributors in 1913. This was mainly because half of the distributors were confined to that area. The entire state was as good for those who have the entire state in which to operate. North Central Iowa is heralded as an especially excellent territory for Des Moines because of the splendid crops there last year. The total number of cars sold from Des Moines last year is estimated at 4,000. Of this number about 2,500 were Fords, about 500 were Overlands, and about 160 were Oaklands. The cars selling from the Ford price to about \$1,200 are the most popular in the territory.

COLUMBUS SHOW SCORES SUCCESS

Columbus, O., March 7—Despite the rather unfavorable weather which prevailed part of the week, the second annual motor carnival given under the auspices of the Columbus Automobile Trades Association and the Columbus Automobile Club, which ended today, was a complete success. The results were far in excess of those anticipated by the dealers and it is assured that the carnival will be an annual affair in future years.

Sales were numerous from all of the agencies. During the middle of the week when the weather was fairly nice, demonstrations were possible. The closing of the carnival was in the nature of a mardi gras and a general good time was had by the spectators.

REFUSES TO ENJOIN KLAXON

New York, March 11—Special telegram—Application for a preliminary injunction restraining the Lovell-McConnell Co. from interfering with H. W. Johns-Manville's advertising contracts and from issuing advertisements threatening infringement suits against dealers, agents or users of the Long horn has been denied by Judge C. J. Lacombe in the United States circuit court of appeals.

TO REVIVE THE AMPLEX

Indianapolis, Ind., March 9—Melville W. Mix, receiver for the Amplex Motor Car Co., of Mishawaka, Ind., has sold the company's plant and other property to interests represented by H. M. Pulcifer of East Chicago. Mr. Pulcifer submitted the only bid, which was \$500,000, and the necessary legal papers making the transfer of the property are now being prepared.

The complete personnel of those interested with Mr. Pulcifer has not been made public, but it is known that among those interested with him are E. J. Gulick, former secretary and general manager of the Amplex company, and C. W. Microscope of Chicago.

Organization of the Amplex Mfg. Co., under which name the new owners will operate, is now being completed. Within a few days articles of incorporation, show-

ing an authorized capitalization of \$500,000, will be filed with the Indiana secretary of state.

Plans are being made to manufacture a high grade car. It will be manufactured in several models and will have a six-cylinder sleeve-valve motor which has been designed by Mr. Gulick. It is announced that R. W. Randall, who has been works manager during the receivership, which began last year, is to be continued in a similar capacity by the new management.

CHICAGO DEALERS CHOOSE ALLISON

Chicago, March 9—The annual meeting of the Chicago Automobile Trade Association was held this evening and the regular ticket installed without opposition. The new slate is made up as follows: President, H. M. Allison, Packard; vice-president, C. W. Stiger, Stromberg carbureter; secretary, D. E. Whipple, Detroit electric; treasurer, Henry Paulman, Pierce-Arrow; directors, H. C. Tillotson, Stromberg carbureter; Ralph Temple, Jackson.

STROUT RESIGNS HAYNES JOB

Kokomo, Ind., March 9—George H. Strout, who for the past year has been general sales manager of the Haynes Automobile Co., of Kokomo, Ind., resigned his position, effective April 1. Strout has not yet announced definitely his plans for the future, but it is expected he will become identified with one of the well known motor car makers. Temporarily, at least, he will continue to make Kokomo his residence. A. G. Seiberling, general manager of the Haynes company, states that Strout leaves on his own volition, and with the best of feelings on the part of all concerned.

DAUCH BUYS SANDUSKY PLANT

Sandusky, O., March 7—The plant of the Sandusky Auto Parts and Motor Trucks Co., of Sandusky, sold under the orders of the federal court, has been purchased by James J. Dauch, president of the Hinde & Dauch company, for \$78,000. The property was appraised at \$126,500. Attorney Neff, of Cleveland, representing a number of creditors, protested the sale on the ground that the blanket bid prevented the sale of the plant in parts. It is expected that the plant will be used for the manufacture of tractors and motors.

PEERLESS PROMOTES R. J. SCHMUNK

Cleveland, O., March 9—R. J. Schmunk, for several years sales manager and for the past year director of sales of the Peerless Motor Car Co., has become general sales manager, the company's chief executive of the selling division. About 7 years ago he joined the Peerless selling forces and in a short time became sales manager.

Axle Patents Taken Over by a Holding Concern

Packard and Peerless Officials in Kardo Company

DETROIT, Mich., March 9—With a quiet formation, the Kardo Co., recently incorporated in Ohio with headquarters at Cleveland and having a capitalization of \$1,000,000, looms up as one of the most important of patent holding companies in the motor industry, and has as its officers and directors very prominent figures in the motor car field. Alvan Macauley, vice-president and general manager of the Packard Motor Car Co., heads the new Cleveland organization, while T. C. Frech, of the Peerless, is vice-president; and F. C. Dorn, American Ball Bearing Co., is secretary and treasurer. Besides these men, the board of directors of the Kardo Co. includes Milton Tibbetts, patent counsel of the Packard company, F. S. Terry, of the Peerless company, and Walter C. Baker, of the American Ball Bearing Co.

Although the Kardo company is incorporated for the purpose of "acquiring, owning and dealing in vehicle patents," its chief concern at this time is with the axle patents of the Packard Motor Car Co., the Peerless Motor Car Co., and the American Ball Bearing Co. These patents so overlapped and dovetailed one another that some sort of holding company for all of them was necessary to prevent litigation among the three concerns above named. By the transfer of all patents to the Kardo Co., protection is thus gained for all, since all can use the patents of all without conflict.

The formation of this holding concern for these axle patents makes a very strong combination, and since all other axles are said to be infringements of one or more of these patents, it is pointed out that other makers either will have to take out licenses or lay themselves open to litigation.

The following statement issued by the Kardo Co., will serve to throw some light on the policy and objects of the concern:

The Packard Motor Car Co., the Peerless Motor Car Co. and the American Ball Bearing Co. have, since the earliest days of the industry, independently and at large expense developed axles that they believe are best suited to their respective trades. The patents on these axles, pertaining as they do to component parts, are so closely correlated and interlaced that the axles of either of the companies cannot be built without infringing the patents of the other companies.

This three-cornered patent situation has been a vexatious question for some time, each company claiming that the others and the trade generally infringe its axle patents, and litigation has been frequently threatened. The situation became so acute and disturbing recently that a way was sought to relieve it. Careful study made it evident that the industry, including the three companies whose patents were directly involved, and motor car users generally, were interested in the final outcome and would be benefited by the removal of the menace and the avoidance of expensive and wasteful litigation. It seemed, therefore, that the patents should be so owned that licenses under them might be enjoyed upon reasonable and equitable terms by all manufacturers and users.

The patents are now owned by the Kardo Co. Some licenses under them have been granted and the company is negotiating others at the present time. Of course, the usual royalty reservations will be made, and manu-

facturers will receive licenses that will insure them the right to make and sell to their customers axles that are free from charges of infringement. It is sincerely hoped and confidently expected that no litigation whatever will be necessary to the accomplishment of this constructive work.

JANUARY EXPORTS AND IMPORTS

Washington, D. C., March 10—Special telegram—The bureau of statistics today announced forty-five commercial cars valued at \$74,491 and 2,481 passenger cars valued at \$2,174,392 were exported in January last as against eighty-seven commercial cars valued at \$182,271 and 2,070 passenger cars valued at \$2,051,806 exported corresponding month last year.

During 7 months' period ending January, 1914, the number of commercial cars exported was 436, valued at \$714,261, and the number of passenger cars was 13,553, valued at \$12,540,593. For the corresponding period 1913, the number of commercial cars exported was 462, valued at \$872,375, and passenger cars to the number of 11,555, valued at \$11,350,156.

The United Kingdom was the largest customer in January, taking 1,030 cars, at a value of \$853,973. Canada was second with 370 cars, valued at \$423,093, Asia was third, with 193 cars, valued at \$163,641.

MANY DRAWBACKS ALLOWED

Washington, D. C., March 6—A drawback allowance was today granted by the treasury department on the exportation of motor cars, chassis, self-propelling trucks, truck chassis, axles, and motor units, manufactured by the Buick Motor Co., Flint, Mich.; Weston-Mott Co., Flint, Mich.; Northway Motor and Mfg. Co., Detroit Mich.; Cartercar Co., Pontiac, Mich.; and the Olds Motor Works, Lansing, Mich., with the use of various imported articles, parts and materials and parts manufactured in the United States with the use of imported articles, parts and materials as specified in the sworn statement of the General Motors Co., Detroit, Mich., the parent company. There is a drawback on babbitt metal manufactured by the Frictionless Metal Co., Chattanooga, Tenn., with the use of imported antimony and domestic lead.

OFFERS NEW NEW YORK LAW

Albany, N. Y., March 6—A new motor vehicle bill to take the place of the Callan law was introduced on March 4 by Senator W. R. Herriek, of New York. This bill provides for higher registration fees than now are exacted by the state, but the scale is so graduated that the owner of the little car will not have to pay more than \$10 a year, which is the rate for a car of 20-horsepower weighing less than

2,000 pounds. The bill also provides that operators must be licensed, whether owners or chauffeurs, but that the owners that swear they have driven more than 500 miles need not be subjected to examination. Another new requirement is that all operators shall wear badges.

The following will give the five divisions under which motor cars are to be taxed according to the Herriek bill:

First—Those under 22 horsepower and weighing less than 2,000 pounds, paying a license fee of 50 cents a horsepower.

Second—Those under 22 horsepower and weighing more than 2,000 pounds, paying 60 cents a horsepower.

Third—Those between 22 and 36 horsepower and weighing under 3,000 pounds, paying 70 cents a horsepower.

Fourth—Those having between 22 and 36 horsepower and weighing more than 3,000 pounds, paying 80 cents a horsepower.

Fifth—Those of 36 horsepower or more, paying \$1 a horsepower.

Commercial trucks weighing more than 2 tons are to pay the license charge as above, with \$10 extra. There is a flat rate of \$10 for electric vehicles, except that electric trucks are to pay an excess weight charge of \$10.

KLAXON SCORES LEGAL VICTORY

New York, March 10—The preliminary injunction against the Garland Auto Co., which used Sparton horns, will stand, according to a memorandum of Judge D. J. Hough in the United States district court for the southern district of New York. No final appeal will be entered in that court until the appeal of the Newton people in Judge Chatfield's case in Brooklyn is decided. This probably will be brought up for a hearing in the first part of April.

Judge Hough says, "In my opinion the interpretation given to the patents by Judge Chatfield is such as to make the horn before me an infringing article because a wheel having teeth capable of producing a camming effect struck in quick succession the wear piece of a diaphragm."

"In my judgment, the Sparton horn does show a camming process. This case must take the same course as did the one of the eastern district, if the latter case be appealed."

STUTZ TO BUILD NEW PLANT

Indianapolis, Ind., March 7—The Stutz Motor Car Co., of Indianapolis, announces that it has completed plans for building a new factory which will cost, when completed, more than \$100,000. The new factory will be located at Tenth street and Capitol avenue on the property recently bought from Harry S. New. It will adjoin the factory occupied by the former Stutz Auto Parts Co., which is now a part of the Stutz Motor Car Co., as a result of the recent merger.

The new building will be equipped throughout with the newest machinery. The building will have a frontage of 80

feet on Capitol avenue and 204 feet on Tenth street. It will be four stories and made of concrete, with brick facings. It will have steel frame windows.

The general offices of the Stutz company and the assembly plant, which are now located at 430 North Capitol avenue, will be moved to the new plant. The offices will be on Capitol avenue on the first floor. The back part of this floor will be used as a storage room for such heavy parts as frames, motors, transmissions and axles. The road test will be located on this floor also. The second floor will contain the first and final assemblies and the third floor will house the paint shop and the finishing department. The top floor will be used for top building and the upholstery shop.

The present retail salesrooms of the Stutz company, which are at the Carl G. Fisher Auto Co., 400 North Capitol avenue, will not be moved. The Fisher company has the state agency for the Stutz cars and will continue to handle them in this territory. The company will continue its present selling plan, according to Mr. Myers, and will distribute its cars through distributing points in the larger cities as has been the custom.

ABBOTT CAR CO. INCORPORATES

Detroit, Mich., March 9—The Abbott Motor Car Co., which, with E. F. Gerber, of Pittsburgh, at its head, took over the Abbott Motor Co. last fall, has been incorporated recently in Michigan with a capital stock of \$150,000. Of this, \$32,500 has been paid in cash, while enough more to make half of the total already has been subscribed. The incorporators, besides Gerber, are C. L. Mann and H. C. Baldwin. The Abbott company is expanding, due to increasing business, and now has under construction a three-story brick addition to its present factory buildings. This will help to house several of the departments which lately have been added to the factory, such as top work, and painting of bodies.

DIVIDEND BY RUBBER GOODS MFG. CO.

New York, March 7—The Rubber Goods Mfg. Co. has declared a dividend of 3 per cent on the common stock. The directors also declared the regular quarterly dividend of 1.75 per cent on the preferred stock. Both dividends are payable March 16. A year ago the Rubber Goods Co. paid a dividend of 6 per cent on the common stock and 3 months ago 1 per cent. The annual meeting of the company will be April 9.

PEERLESS COMPANY ELECTION

Cleveland, O., March 6—Stockholders of the Peerless Motor Car Co., have elected T. C. Frech a director in place of F. S. Terry. Mr. Frech takes J. B. Crouse's place as vice-president and becomes general manager. Mr. Terry and Mr. Crouse

retain all their interests in the company. The officers now are L. H. Kittredge, president; E. H. Parkhurst and T. C. Frech, vice-presidents; H. A. Tremaine, treasurer, and G. B. Siddall, secretary.

WATERMAN SUCCEEDS REEVES

Jersey City, N. J., March 10—Arthur Waterman, who for the past year has been sales manager for the G. C. Vaporizer Co., New York city, has been made vice-president and general manager of the Hartford Suspension Co. Mr. Waterman formerly was connected with the Hartford company for a number of years and succeeds Al. Reeves, who now is general manager of the Automobile Chamber of Commerce.

U. S. RUBBER REPORTS PROFITS

New York, March 6—The United States Rubber Co. has issued its annual statement for the 9 fiscal months to December 31. Owing to a change in date of the fiscal year from March 31 to December 31, only 9 months' period is covered by the report. The net sales were \$87,349,692 and the net profits were \$7,140,125. The net sales included footwear, tires, mechanical and miscellaneous goods.

Included in the surplus of \$1,811,268, are the earnings of certain subsidiaries for the 3 months ended March 31, 1913, estimated at \$764,657. Deducting this and \$10,939 applicable to minority interests, there remains a balance of \$1,035,672. After adding 4.5 per cent paid on the common stock, amounting to \$1,620,000, the total, \$2,655,672, represents the amount available for

common dividends for the 9 months, equal to 7.37 per cent on \$36,000,000 common stock outstanding, or at the rate of 9.83 per cent per annum. This compares with 7.46 per cent for the year ended March 31, 1913.

The company's financial position is strong, the cash on hand being approximately \$10,000,000. The company has increased the value of its plants from \$105,000,000 last year, to about \$118,000,000. This includes the new Canadian plants, Sumatra rubber plantations, and the enlargement of the Morgan & Wright tire plant at Detroit with some minor construction. The year 1913 was one of declining prices. Consequently the same quantity of manufacturing goods would represent a less amount in dollars and cents. The volume of business of the company, as a whole, was somewhat larger for the 9 months of 1913 than for the corresponding period of 1912.

STUDEBAKER REPORT OUT

New York, March 9—The report of the Studebaker Corp. for the year ended December 31, 1913, shows profits of \$2,767,458, a decrease of \$575,102 from the previous year, with a total income of \$2,850,923, which was a falling off of \$614,029. Following the payment of interest, charges, etc., there remained a balance of \$871,399, a decrease of \$511,021. The profit and loss surplus of December 31, 1913, was \$2,099,926. The sales for the year amounted to \$41,464,950, compared with \$35,440,328 in 1912.

Tire Companies Sued Under Trust Law

Co-Operative Concern Wants Big Damages

CLEVELAND, O., March 9—Special telegram—The Automobile Co-operative Association of New York, in the United States court today, sued the B. F. Goodrich Co., Diamond Rubber Co., Firestone Tire and Rubber Co., of Akron, United States Tire Co., of New York, and Republic Rubber Co., of Youngstown, and the officers of these firms.

Damages of \$450,000 is asked under the Sherman anti-trust law and the co-operative company charges the five rubber concerns combined as a trust to put it out of business. Suit was brought by William C. Dickerman, president of the Co-operative association. Howard S. Williams, of New York, James A. Fowler, of Knoxville, Tenn., and O. E. Harrison, of Columbus, are attorneys for the complainant.

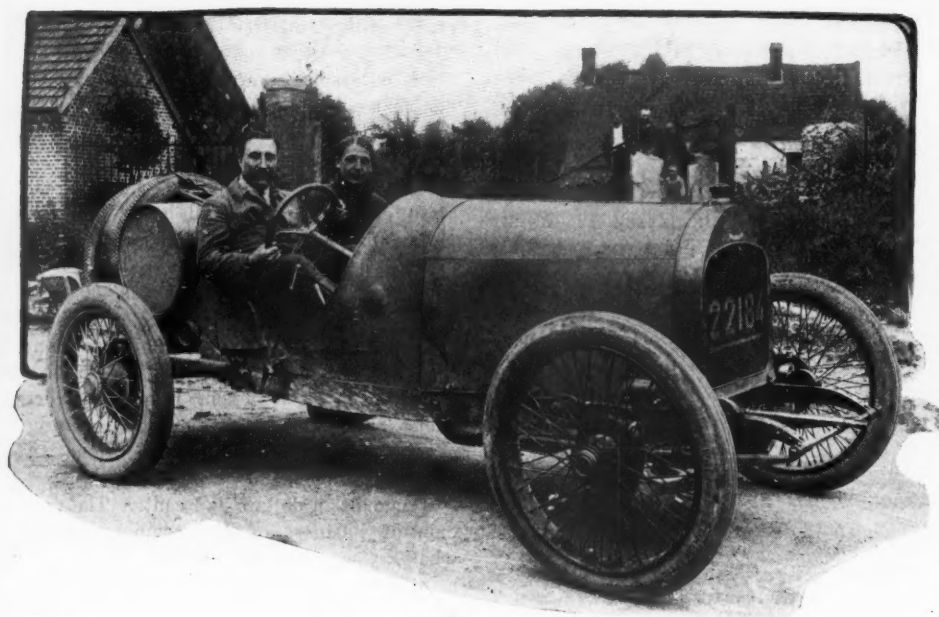
The petition charges that the defendant companies have organized a dealers' protective association, and have maintained a "spy system," operated by "agents, spies, and detectives," to obtain information with respect to motor car supplies furnished by other dealers. This system, the petition declares, was used by the de-

fendants in boycotting and blacklisting their competitors. The complainant alleges that it was driven out of business in 1911 because of these alleged acts.

As Chicago Views It

Chicago, March 10—The effort of the Automobile Co-operative Association of New York to have five big tire companies declared a trust under the Sherman anti-trust law does not seem to worry local representatives of the concerns against which the Cleveland suit is aimed.

"As I understand it," said one of the branch managers, "this may be an effort on the part of the complainant to compel us to quote dealers' prices. It has been our policy with these co-operative companies to give them only consumers' prices, which greatly handicap them. In most cases these concerns only have an office, do not carry any supply in stock and because of the small overhead are able to quote prices which regular dealers cannot compete with. I fail to see why we cannot quote any prices we desire and it is to protect our regular trade that we give only consumers' rates to such concerns."



JOSEPH CHRISTIAENS AND EXCELSIOR, ENTERED IN 500-MILE RACE AT INDIANAPOLIS

Sunbeam Builds Car for Indianapolis

Chassagne's Mount Different from Others

LONDON, March 2—In all probability three Sunbeams will be entered at the Indianapolis speedway, May 30, all of them six-cylinder cars. One of these has been built specially for the speedway and has a wheelbase of only 83 inches. It is to be driven by Jean Chassagne, who has put up several world's records at Brooklands.

The other two cars have been campaigned before. One of them has been sold to Harry Grant and the third, the one which was raced at Indianapolis last year, has been bought by a Mr. Van Raalt. Grant's Sunbeam is one of the 1913 grand prix of France $4\frac{1}{2}$ -liter cars. All three have the same size of motor, 3.14 by 5.90 inches, the same displacement as in the standard 16-20-horsepower four-cylinder Sunbeam touring car.

In all except the engine, the new special car is smaller than the older ones, and it is reported that the Sunbeam company offered it to Grant for the same price as he paid for the one he bought. The company either will enter its new special machine itself or is willing to consider the offer of any private sportsman to buy the car and run it under his own name, but it wants Chassagne to drive the car.

The new car embodies features which are the result of last year's experience at Indianapolis. While the chassis is specially prepared, the motor is the one with which Chassagne made the 12-hour record at Brooklands, averaging 89.85 miles per hour. According to Louis Coatlen, chief engineer of the Sunbeam company, the motor develops 18 horsepower more than do those of the two larger cars.

A special feature is that it is fitted with

two carbureters and two inlet pipes. The short wheelbase of 83 inches has necessitated designing a special gearbox, with very short shafts, giving two speeds only. It is carried on the same subframe as the engine, hung from the main frame by three universal hangers.

Modifications in the oiling have been made with a view to cooling. The bulk of the oil, instead of being carried in the base chamber, is carried in a tank at the back of the chassis. A large pipe, avoiding skin friction, is led from this tank to the pump in the base chamber, and is forced to all the bearings. After it has been through the bearings the oil returns to the base chamber, from whence it is forced back to the oil tank by a secondary pump, so that it is not exposed to the heat in the crankcase for any length of time. The car is fitted with detachable wheels, 32 by $4\frac{1}{2}$ in front and 34 by $4\frac{1}{2}$ in the rear.

Chassagne is a Frenchman occupying the position of chief race driver and tester with the Sunbeam company. He has been in the French navy and has a record as an aviator.

CHRISTIAENS A VETERAN DRIVER

Paris, Feb. 24—Joseph Christiaens, chief of the Excelsior racing team, who has just handed in his engagement to the European representative of the Indianapolis motor speedway for the Memorial day race on the Indianapolis track, will drive the six-cylinder Excelsior car built for the French grand prix at Amiens last year, in which race the car finished eighth. The Excelsior racer is built near

Brussels, Belgium, and has cylinders in two sets of three measuring 90 by 160 millimeters bore and stroke. Valves are on one side, two Claudel carbureters are used and a Bosch magneto is fitted. The crankshaft is carried in seven plain bearings, to which oil is delivered under high pressure. The transmission comprises a cone clutch, four-speed gearbox and shaft drive. Palmer tires have generally been used on the Excelsior racers and the wheels are always Adex detachable. The weight of the car is 1,980 pounds.

Christiaens is of Belgian nationality, about 30 years of age, and is considered one of the best race drivers in his own country. At the beginning of the motor industry Christiaens entered the Darracq factory, where he was employed as tuner-up in many of the races entered by that firm. Later he transferred his services to the Vivinus company, in Belgium, occupying the position of chief engineer. While with this company he won the Liedekerke cup in 1909. His connection with Vivinus led him to take up flying. He had charge of the motors on one of the first Voisin biplanes, and was one of the first dozen men in Europe to secure an aeroplane pilot's certificate. He learned to fly in 8 days without breaking a spar.

For the last 3 years Christiaens has devoted himself entirely to the racing department of the Excelsior company, taking part in all the big European races for this firm. He has done a lot of work on Brooklands track and in the 850-cubic inch class holds all the world's records. He has covered the $\frac{1}{2}$ -mile flying start at the rate of 108.30 miles an hour, the mile flying at 106.86, and ten laps standing start at 101.66 miles an hour.

MORE RACES FOR FRANCE

Paris, Feb. 27—Le Mans will this year hold a 3-day speed carnival only second in importance to the French grand prix. On Saturday, August 15, the Automobile Club of France will run its annual motorcycle race on the outskirts of the town rendered famous by the late Wilbur Wright. The following day a light-car race will be run over the same course, and on Monday there will be a second edition of the French grand prix for cars of not more than $4\frac{1}{2}$ liters cylinder area.

The light-car race is an entirely new move. It is limited to machines having a cylinder area of not more than 85.4 cubic inches, and weighing not less than 770 nor more than 1,100 pounds empty. The limits exclude pure cyclecars, according to the European definition, but provide for the small, cheap, light machines which are becoming immensely popular throughout France. Each car must carry two men seated side by side, but the mechanic's seat can be 9 inches to the rear of the driver.

The course selected is a triangular one a few miles to the south of Le Mans, and claimed to be the fastest in France. It

was on this course that Bablot in a Delage established a record of 82.5 miles an hour for one lap during last year's race. Two of the legs of the course are practically dead straight and the third is but slightly winding.

The big-car race, to be known as the grand prix de France, will be run on exactly the same lines as the Automobile Club race at Lyons, the maximum cylinder area being 274 cubic inches. As there are thirty-nine cars entered in the Lyons race, there is no doubt of securing a big entry for the second race under these rules, at Le Mans.

CHICAGO SPEEDWAY PROPOSED

Chicago, March 9.—The Chicago Motor Speedway Association is the latest announcement, with D. F. Reid as president and John H. Palmer as secretary and treasurer. This association has purchased 500 acres of land near Flossmoor some 28 miles from Chicago on the Illinois Central, and proposes to erect a 2-mile concrete speedway, which it is hoped to have ready for racing in the fall. The turns are to be 75 feet in width and the straights 60 feet. The grandstand will hold 100,000 and there will be parking space for 25,000 cars. The capital stock

of the association is \$1,000,000, all stock being common and non-assessable.

More racing is planned for Chicago, application having been made by David T. Alexander, representing the interests that own Hawthorne track, for two sanctions for dirt track meet next summer. He wants July 4 and 5 and September 3 and 7. He proposes to put the old course in the finest shape possible and to stage a long distance race on July 4, for which a purse of from \$7,500 to \$10,000 will be offered.

NAPIER HOLDS UPKEEP TEST

London, Feb. 22.—A contest to encourage economical operation of motor cars somewhat similar to the competition promoted by the Winton company in the United States annually was held by D. Napier & Son, Ltd., London, from April 15 to October 15, 1913. The judges have just made their report. In the six-cylinder division, the six winners had a total mileage of 41,759 miles, the average gasoline consumption was 17.01 imperial gallons to the mile and the total cost of repairs was \$6.78. The six victorious drivers in the four-cylinder division covered 36,948 miles and averaged 22.15 imperial gallons to the mile.



CHASSAGNE IN SUNBEAM BUILT FOR INDIANAPOLIS

Details of Maxwell's New Racing Cars

Harroun Promises Speed for Indianapolis Grind

CHICAGO, March 7.—That the three Maxwell racing cars which Ray Harroun is building at the Maxwell's Detroit factory, to make their debut at Indianapolis, will have some unusual features of design is made certain by Harroun's disclosure of certain of the details of construction. That they will be speedy is assured by the fact that the former speedway champion is their designer. He is an engineer of no mean ability as well as a racing driver. Their speed also is assured from the fact that Harroun's contract with the Maxwell people calls for a speed of 1 minute 37 seconds for a lap on the speedway. This is equivalent to 92.5 miles per hour, faster than any official lap time ever made at Indianapolis.

The three cars are to be alike in every respect, according to the present program and have four-cylinder motors of 4.2 inches

bore and 8 inches stroke, giving them a displacement of 443.328 cubic inches. The cylinders are cast in block, having a three-bearing crankshaft suspended on ball bearings. One of the unique features of the cars is that there is no flywheel, counterweights on the crankshaft taking its place. Harroun believes that better balance can

be obtained by distributing the weight along the crankshaft rather than by concentrating it at one end, as is done with the conventional flywheel.

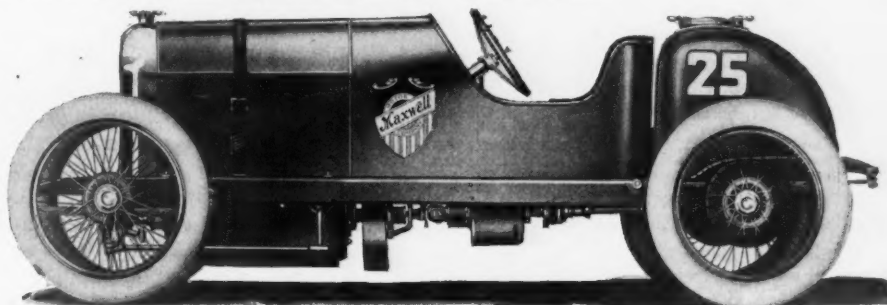
Both intake and exhaust valves are in the head of the cylinder and are very large. All the valves are operated by a single overhead camshaft whose cams operate through rocker arms, pivoted on the cylinder-head castings. The cams are arranged to give quick opening of the intake and quick closing of the exhaust.

Reciprocating parts of the motor have been made exceptionally light, but, on the other hand, the cylinders, crankshaft and engine base are nearly 50 per cent heavier than ordinarily is employed even in racing practice, this to keep down the vibration.

In the oiling system Harroun has adopted an unusual method, one which is just the reverse of ordinary practice. All of the racing cars heretofore have supplied the extra oil needed at exceptionally high speeds, by a hand pump operated by the mechanic and in case of a breaking of the hand pump or its connection or the neglect on the part of the mechanic the car suffers from insufficient lubrication, which at times puts it out of the race. In the new Maxwell racers, the system is so arranged that stopping of the hand pump causes over-lubrication instead of the reverse, a much less serious and more easily remedied difficulty. The oil is forced by an engine-driven pump through large pipes directly from the tank at the rear to the engine bearings, the cylinders being lubricated by the spray, but there is no splash chamber in the crankcase. The excess oil from the bearings gathers in the crankcase, from which it is returned to the oil tank at the rear.

Normally the pump feeds too much oil when the engine is operating at high speeds, so that the crankcase fills up and the engine is over lubricated, unless the hand pump is operated, which forces some of the oil back to the tank through a bypass without going to the engine.

All three cars are under construction at present and two of them, at least, will be ready for try-outs not later than April. Harroun will have direct charge of the racing team under the chaperonage of E. A. Moross, but will not drive in races. Although all of the drivers have not been signed up definitely, it is understood that two of them finished in the money at Santa Monica.



HOW MAXWELL'S NEW RACERS WILL LOOK

Aftermath of the Road Race Meet at Santa Monica

Gross Receipts \$47,000—Grand Prix an Interesting Battle

LOS ANGELES, CAL., March 5.—Aftermath of the Santa Monica road race meet of the Western Automobile Association reflects great credit on the promoters and shows that, properly handled, the two great classics can be run with profit, both financially and from the sport viewpoint. Whereas, Chairman Shettler guaranteed only \$15,000 in prize money for the Vanderbilt and grand prix, yet when the final count was made it was discovered that the drivers could split \$20,000. Be it understood also that the Western Automobile Association is so organized that it cannot keep the money it makes, which accounts for this extra division of the profits of the late meet among those who furnished the show—the drivers. The total receipts were about \$47,000, it is reported by Chairman Shettler.

Meet Efficiently Handled

The meet was handled most efficiently and there were only two accidents, one in each race. In the Vanderbilt, Pullen blew a tire on Death turn which upset him, and in the grand prix, at the same spot, Marquis in a Sunbeam turned turtle. The latter accident resulted in injuries to both driver and mechanic. Marquis, who was hurt more seriously than his mate, is coming along nicely though, and soon will be himself. The course was well guarded, the spectators in the stands were kept advised of the progress of the race by means of the Pendleton score board, which showed positions instead of time, while in every other department Chairman Shettler was most successful in having his plans carried out.

With at least 100,000 persons at each race, naturally the Californians are impressed with the possibilities of the future and if the two classics ever leave the coast it will be surprising. Indeed, there is a strong movement on hand right now to keep both of them here for next year. San Francisco wants one of the races at least and Los Angeles the other. It is pointed out that the 1915 exposition

By C. G. Sinsabaugh

should have such a motoring attraction and the San Francisco delegation that attended the race banquet last Saturday night presented arguments why it should have one of the races.

It is suggested that Los Angeles keep the Vanderbilt and let San Francisco have the grand prix. The Western Automobile Association could stage the Vanderbilt in the early spring, while the grand prix could be run in the fall. The exposition authorities have endorsed the appeal of San Francisco and it is said that Golden Gate park can be secured for a race course.

Looking back over the races themselves, one finds that there was keen competition in both, although the finish of the grand prix, in which Pullen was some 40 minutes ahead of the next car, Ball's Marmon, might indicate otherwise. As a matter of fact few races have been harder fought than the 1914 grand prix. Had the machines stood up the finish would have been hair-raising.

Up to the end of the twenty-second lap, when a burnt-out bearing forced his retirement, Wishart seemed a certain winner, having 7 minutes 9 seconds lead over De Palma, who was runner-up. He was hitting close to 84 miles per hour, much faster than the Vanderbilt pace up to this point. Bunched back of him were five of his rivals—de Palma, Marquis, Anderson, Oldfield and Pullen in the order named—and it was a remarkable fact that there only was a difference of 53 seconds between de Palma, second, and Pullen, sixth. Wishart led for the first twenty-two laps, giving way to de Palma, who led for seven laps, being stopped by a broken intake valve at the twenty-ninth lap. When the Vanderbilt hero went to the front and he led Marquis by only 23 seconds, when he slowed in the twenty-ninth, with Anderson third, Oldfield fourth and Pullen fifth. Between first and fifth there was

a difference of just 4 minutes 31 seconds.

Marquis forged ahead when de Palma developed valve trouble, and when he turned turtle in the thirty-third he had accumulated a lead of 1 minutes, 50 seconds over Pullen, who had climbed to second. De Palma, Anderson and Oldfield were a little more than 2 minutes back of Pullen, de Palma being 6 seconds ahead of Anderson and Gil 6 seconds ahead of Oldfield.

Fail to Break World's Record

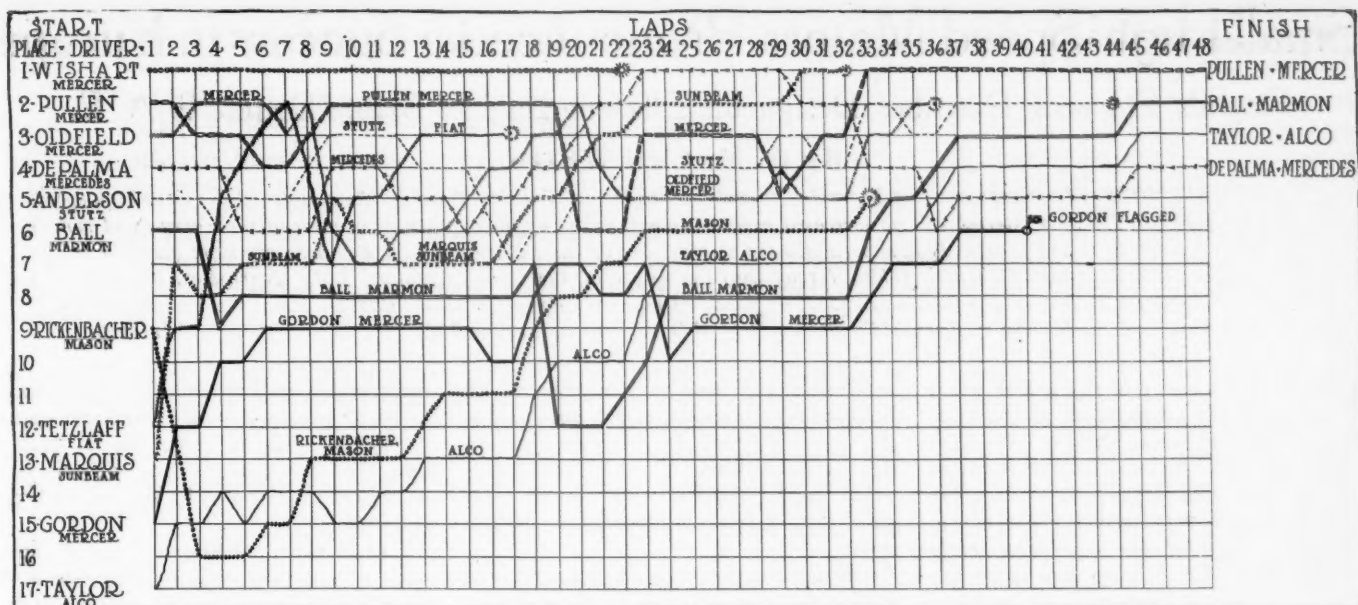
At the end of the thirty-third lap Pullen was 2 minutes 51 seconds ahead of Anderson, who was 9 seconds in front of Old field, with de Palma laboring 23 seconds back of Barney. After this, though, the eliminations came fast and after the forty-fourth lap Pullen had absolutely no competition. Anderson, the last of the speedy ones, was marooned in the back stretch and there was nothing left for Pullen to do but finish. So he cut his pace down and jogged home, leaving Tetzlaff still in possession of the world's record, which surely would have been shattered if the competition had lasted.

After his demonstration in the grand prix, the critics were convinced that de Palma would have had a hard fight to have beaten the Mercer star in the Vanderbilt had it not been for the upset on Death curve. It will be remembered that while he lasted in the first classic, Pullen was hitting a merry clip and had accumulated a lead of about 4 minutes when he went out in the thirteenth lap. Following this, Anderson enjoyed the sensation of leading the field for four laps. Then de Palma went to the front, following Gil's elimination, leaving Oldfield the only one with a chance. Tire trouble, though, shunted Barney into second place, but the veteran had the satisfaction of knowing that the 1914 Vanderbilt was the best race he ever drove.

There was some mystery as to what caused the withdrawal of the Anderson Stutz. Now it is stated that a broken

OFFICIAL TIMING REPORT ON THE GRAND PRIX CUP RACE AT SANTA MONICA, CAL., FEBRUARY 28,

No.	Car	Driver	Lap 1	Lap 2	Lap 3	Lap 4	Lap 5	Lap 6	Lap 7	Lap 8	Lap 9	Lap 10	Lap 11	Lap 12	Lap 13	Lap 14	Lap 15	Lap 16	Lap 17	Lap 18	Lap 19	Lap 20	Lap 21	Lap 22
4	Mercer...	Pullen.	6:16		18:57	25:17	31:25	37:32	43:47	49:55	55:55	1:01:56	1:07:56	1:14:01	1:20:06	1:26:07	1:32:12	1:38:07	1:44:05	1:50:03	1:56:03	2:02:09	2:14:38	2:20:36
17	Marmon	Ball.	6:50	13:10	19:40	26:11	32:43	39:14	45:45	52:15	56:48	1:05:26	1:12:10	1:18:53	1:25:35	1:32:18	1:38:39	1:45:08	1:51:58	1:58:56	2:05:42	2:12:42	2:19:43	2:26:52
6	Alco.	Taylor	6:30	14:51	22:01	29:11	36:24	43:39	50:48	57:50	1:05:02	1:12:08	1:19:16	1:26:26	1:33:31	1:40:37	1:47:47	1:55:57	2:02:09	2:09:22	2:16:52	2:24:10	2:31:32	2:39:05
12	Mercedes...	DePalma.		13:11	19:32	25:47	32:09	38:40	44:58	51:21	57:37	1:03:37	1:10:15	1:16:35	1:22:56	1:29:13	1:35:27	1:41:46	1:48:09	1:54:23	2:00:42	2:07:04	2:13:24	2:19:43
3	Stutz	Anderson	6:39		19:36	25:56	31:58	38:14	44:56	50:49	57:07	1:03:24	1:09:40	1:15:56	1:22:11	1:28:25	1:34:41	1:42:12	1:48:41	1:55:03	2:01:25	2:07:47	2:14:08	2:20:29
9	Mercer...	Gordon.	7:20	14:06	20:50	27:33	34:08	40:58	47:46	54:34	1:01:24	1:08:10	1:15:02	1:21:52	1:28:46	1:35:40	1:42:34	1:49:20	1:56:21	2:03:27	2:10:28	2:17:27	2:24:28	2:31:26
7	Mercer...	Oldfield	6:27		18:52	25:06	31:09	37:22	43:29	49:44	58:15	1:04:35	1:10:46	1:16:54	1:23:03	1:29:16	1:35:25	1:41:36	1:47:43	1:53:52	2:00:05	2:06:22	2:14:07	2:20:31
20	Mason	Richenbach'r	7:03	13:42	24:18	30:50	37:32	44:03	50:35	57:07	1:03:42	1:10:15	1:16:45	1:23:19	1:30:01	1:36:50	1:43:32	1:50:25	1:58:01	2:04:29	2:11:04	2:17:32	2:24:00	2:29:35
14	Sunbeam	Marquis		13:37	19:57	26:06	32:24	38:42	45:22	51:44	58:01	1:04:25	1:10:41	1:16:59	1:23:16	1:29:41	1:36:00	1:42:19	1:48:39	1:54:59	2:01:17	2:07:36	2:13:51	2:20:15
15	Marmon	Roth.	7:28	14:31	21:26	28:13	35:18	42:19	49:02	55:42	1:02:35	1:09:22	1:16:10	1:23:00	2:05:10	2:11:59	2:18:51	2:26:17	2:33:02	2:40:56	2:48:52	2:56:47	3:04:51	3:12:55
19	Alco.	Janette.	7:25		21:20	28:09	35:04	42:05	49:07	55:03	1:02:53	1:09:46	1:16:36	1:23:24	1:30:13	1:36:57	1:43:08	1:51:15	2:00:37	2:07:13	2:13:52	2:20:57	2:27:54	2:34:08
2	Mercer...	Wishart.	6:15	12:12	16:10	24:07	30:01	35:58	43:00	47:50	53:47	59:44	1:05:41	1:11:35	1:17:38	1:23:39	1:29:30	1:35:25	1:41:20	1:47:17	1:53:11	2:00:09	2:06:19	2:12:26
16	Fiat	Lewis	7:02	13:30	20:11	29:15	35:50	42:58	51:07	57:50	1:04:38	1:11:23	1:18:10	1:25:10	1:32:10	1:35:56	1:42:32	1:49:11	1:58:37	2:07:02	2:13:40	2:24:14	2:26:44	2:33:33
1	Fiat.	Tetzlaff.	6:15	12:32	19:58	25:54	31:36	37:24	43:26	49:28	58:25	1:04:22	1:10:16	1:16:05	1:21:57	1:27:51	1:33:47	1:39:38	1:55:37	Out.—	Broken	conne	ting ro	Out.—
11	Apperson	Goode.		13:36	20:19	27:46	34:30	41:15	47:55	56:26	1:03:03	1:09:38	1:16:12	1:22:47	1:29:24	1:36:03	1:42:36	1:49:15	1:56:18	Out.—	Broken	conne	ting ro	Out.—
8	Stutz	Cooper.	6:46	13:18	19:44	26:01	32:49	Out.—	Broken	Valve.														
16	Fiat	Vorbeck	7:02:30	Out.—	Broken	Valve.																		



POSITIONS OF THE CONTENDERS AT EACH LAP OF THE GRAND PRIZE RACE AT SANTA MONICA

The position chart of the grand prize race forms an interesting study and shows graphically the progress of the 400-mile event. Notice the jockeying for place among the cars during the first ten laps. The only one who did not seem to be affected by this was Wishart, who serenely held first place from the start till the twenty-second lap, when he went out. This permitted de Palma to gain first place after his climb from sixth place to first in six laps. Notice how the elimination of a leader brings all those behind up one place. For instance, in lap 32, the elimination of Marquis in the Sunbeam, who was leading, and de Palma's drop from second to fifth place when he was running on three cylinders, jumped Pullen from third place to the lead, where the Mercer pilot finished.

cylinder stopped him when he was a most important contender.

De Palma Headed for Germany

Chicago, March 10—Ralph de Palma and Harry Grant passed through Chicago yesterday on their way home from the Los Angeles meet. De Palma plans on sailing for Germany on March 17, where he will get the Mercedes car which he is to drive in the 500-mile race at Indianapolis. The holder of the Vanderbilt cup has informed the Mercedes company that he will not drive a six-cylinder as it wanted him to, but that he must have a four-cylinder.

De Palma told of his visit to San Francisco where he was shown three prospective courses for the road race which is to be held in connection with the exposition. One of these is in Golden Gate park and another is part in and part out of the park. De Palma is of the opinion that Los Angeles will formally demand that the Motor Cups Holding Co. give it both

the Vanderbilt and grand prix and then Los Angeles will play the magnanimous and give one of the classics to San Francisco—probably the Vanderbilt.

While in Los Angeles de Palma received the \$3,000 purse due him for winning the 1912 Vanderbilt, payment of which had been withheld because of the financial difficulties of the Milwaukeeans, who now have been able to square the indebtedness. At the same time de Palma collected the \$3,000 purse for winning the 1914 Vanderbilt.

MORE CAPITAL FOR GOODYEAR

Akron, O., March 7.—Without a single dissenting vote the stockholders of the Goodyear Tire and Rubber Co., in special meeting March 3, approved the plan of directors for introducing \$4,000,000 of new working capital by the sale of stock. Present Goodyear stockholders already have subscribed for more than 80 per cent of the stock to be offered.

Additional working capital was made necessary by Goodyear growth. Since 1911 the annual business had grown from \$13,000,000 to \$33,000,000, all this on the basis of \$10,000,000 capital stock. Meantime the company has just completed additions to its factory sufficient for the handling of a \$50,000,000 annual business. More tires are being turned out daily than Goodyear ever made before, and it is expected that the pneumatic tire output will reach 10,000 a day shortly. Comparisons for 3 months as compared with 3 months a year ago, show an increase in tires sold by the Goodyear company 47, 55 and 82 per cent respectively.

NEW YORK'S TAG TOLL HEAVY

New York, March 9—The total money paid for motor car licenses in the past year for New York state amounted to \$1,275,727.27. This included 118,477 passenger car licenses, 13,780 commercial licenses and 56,702 chauffeur's licenses.

AND WON BY ED PULLEN IN A MERCER. DISTANCE, 403.24 MILES; LAP DISTANCE, 8.4 MILES

[illegible]

Small High-Speed Motors Pronounced a Success in Europe

English Engineer Describes Design of Efficient Engines Before Detroit S. A. E.

By D. McCall White

EDITOR'S NOTE—Americans are just beginning to wake up to the possibilities of small motors designed to run at high speed. It may be expected that this interest will be increased before the year is out by the appearance of some of these very small motors to represent Europe in racing events. Indianapolis will see at least one of these Memorial day. Few men are more qualified to discuss the high-speed motor than D. McCall White, former works manager of the Crossley Motors, Ltd., Manchester, England, and late chief engineer for D. Napier & Son, Ltd., London, England, who is now employed with the Cadillac Motor Car Co. He addressed the Detroit section of the Society of Automobile Engineers on this subject last week and his remarks are reproduced herewith:

I HAVE been asked to say a few words regarding the development of the high-speed engine in Great Britain. We have been producing, in some of our factories on the other side, high-speed engines for the last 4 or 5 years which will run successfully in touring cars without any more trouble than the ordinary slow-speed engines. In fact, 5 years ago the company I was connected with was in a position to give a 3 years' guarantee with its cars, the engines of which ran at a maximum speed of about 2,300 to 2,600 revolutions per minute.

Make Good in Territories

Within the last 2 or 3 years we have been producing engines which have been running maximum power at 2,400 revolutions per minute, and these have on the slightest down grade accelerated to 2,800 revolutions per minute. These particular cars have been successful not only in the British Isles, but have been highly satisfactory and successful in our colonies, such as, for example, Australia, New Zealand, etc., where the roads are, I think, pretty much on a par with American roads. In fact, I have, just before leaving England, inspected a report from one of my assistants who was out in Australia inspecting and generally looking into the matter, and his report, as well as the agent's report on the behavior of cars out there, not only of our own production but those produced by other firms which were also of the high-speed class, was entirely satisfactory.

Another firm, with whom I have not been connected, has been most successful in the colonies, not only in competitions such as hill climbing, but in competitions of great hardships over large tracts of land such as you are accustomed to in this country. I am particularly aware of the points in connection with this particular firm, as the engineer is a very great personal friend of my own.

I am stating these points because, in discussing them with some of your engineers, I have found that quite an erroneous idea seems to exist regarding the durability of the high-speed engine, fitted into a moderately light chassis. In the first place, the chassis which these engines are called upon to pull, are not very light chassis, being in most cases just about the same weight as some of your most modern chassis. These chassis are designed to stand up, and they do stand up, not only

in Britain but also in the colonies. A horsepower represents 33,000 foot-pounds of work, whether it be developed in Britain or in America, and if this horsepower can be obtained with a smaller engine, then greater economy will be the result.

Gasoline may be cheaper here than it is in Britain, but I have yet to see the man who refuses to accept the same result as he previously obtained by paying less money for it. As examples of what has been done, I have designed a four-cylinder engine 2½ inch bore by 5 inch stroke, which developed 36 brake horsepower at 2,600 r. p. m., fitting it to a chassis with a wheelbase of 100 inches, the weight being 1,680 pounds. This car was beautiful to handle and it was a marvel to see what it could do on the top gear with a load. It could pull on top gear at 10 miles an hour, on a very decent gradient, in practically the same manner as a six-cylinder engine, 3¼ by 5. The wheelbase of the six was 126 inches and the chassis weight, as far as I can recollect, about 2,632 lbs., both chassis carrying a load of driver and one passenger, plus the weight of 896 lbs.

Most Efficient Valve

As regards speed, the small car was only some 3 or 4 miles an hour slower than the large one. Obviously, the small engine was more efficient and developed a much higher mean effective pressure than the large engine. Undoubtedly, the most efficient valve mechanism which can be designed is the overhead valve system, because the combustion chamber is more perfect and presents less cooling surface to a given volume of gas than any other arrangement.

This arrangement of gear, however, has the inclination to become noisy, as, due to the inertia of the valve gear, which is undoubtedly greater than with any other type and naturally requires correspondingly stronger springs to prevent valve chatter, the rocker pins, etc., soon develop a certain amount of play or wear, especially if the engine is of the very efficient high-speed type. If the engine is not of this type, then there is no necessity for overhead valves.

One can get highly satisfactory results from the exhaust valve in the orthodox position, with overhead inlet valve, and as the power of the motor depends largely upon its volumetric efficiency it will be

easily appreciated, when I state that about 15 to 25 per cent more charge can enter the cylinders for a given size of valve, with this arrangement, than with the arrangement as presented by the L-head type of motor.

I have been astonished to find how many of your engineers on this side still favor the T-head type of motor. This arrangement of valve gear I have found to be the most inefficient on record, and in order even to get moderate efficiency it is necessary to use a two-spark magneto with two sparking plugs, one on either side of the combustion chamber. I have proved this contention more than once, and it has also been proved for me by the fact that two sparking plugs make very little difference in the L-headed type of motor, no matter in what position they are placed. I know that we have been obtaining more horsepower than many makers on this side are obtaining from their engines, with practically the same number of revolutions per minute, which means that we can use an engine considerably smaller in size to obtain the same results. For ordinary sizes or motors, in racing, it is, in my opinion, entirely unnecessary to fit multiple valves unless it is desired to try to run the engine somewhere about 5,000 r. p. m., or unless the bore of the cylinder is so large and the stroke so long that the sizes of the two ordinary valves would be out of the question.

Some years ago, about 7 or more, this was a feature of a well known British firm, who later discarded it entirely.

Valve Design Important

Regarding the design of valves and valve gear generally, I may say that just lately I have been associated with experiments upon an engine running at 4,000 r. p. m. and developing power at that speed, the valves of which were side by side in the conventional L-headed cylinder, and the results were astonishing. I have been using on my own car an engine which developed its full power at 3,000 revolutions per minute, the bore being 3½ inches and the stroke 5½ inches. The wheelbase of the chassis was about 126 inches and chassis weight was, so far as I can remember, about 1,900 lbs. This car could touch about 70 miles an hour in touring trim, open torpedo body, but no wind shield. The acceleration was good, from about 7 miles an hour on top gear.

Electric Transmission of Power Discussed by Engineers

Metropolitan Section of S. A. E. Listens to Talks on Novel Types of Drive

EDITOR'S NOTE—There seems to be a growing disposition in the motoring world to complain about the inconvenience of the old-fashioned change-speed gearset. The fact that it is necessary to alter the ratio of engine speed to wheel speed with changes in load or road conditions is one of the weaknesses of motor car design, but one which is an inevitable concomitant of internal combustion engine characteristics. The interposition of some less rigid but equally positive means of connection between motor and wheels often has been propounded, in the guise of either a hydraulic, pneumatic or electric medium. It is the latter one, in which the speed and power variations of the electric motor and generator are used to make up for the inflexibility of the gasoline engine that was the subject of discussion before the New York engineers.

NEW YORK, March 6—A large number of engineers attended the February meeting of the Metropolitan Section of the S. A. E. last week. The subject discussed was the electric transmission of power as applied to passenger cars and trucks. No formal papers were presented but the subject was talked over in a general way by the prominent engineers present and many interesting points concerning the application of this form of transmission were brought out.

The prevailing opinion was the electric transmission was suited to heavy truck and tractors but not so well adapted to trucks of under 3-ton capacity or to pleasure car work. There was one exception, however, to this and that was the Entz system as used on the Austrain-Daimler which was seen at the New York show and the patent rights for which have been acquired by the R. M. Owen Co., New York.

Three Types Described

Three types of electric transmission were described, the Entz system in which the gasoline motor drives a generator which generates current that supplies a motor, the armature of this motor being coupled to the driveshaft on one end and to the armature shaft of the generator on the other. The field of the generator takes the place of the flywheel, while the field of the motor is stationary, being bolted to the frame. In this system the power is transmitted by a magnetic clutching action, the field of the generator attracting its armature and thus producing a torque that is transmitted to the rear wheels. On intermediate speed, in addition to this magnetic clutch, the drive is assisted by the motor, the current from the generator being sent through the motor.

The Entz system takes the place of clutch, gearset and starting motor and electric lighting generator, and for this reason the total weight of this chassis is no more than when a mechanical drive is fitted.

In connection with this system, David Beecroft, of Motor Age, pointed out that the performance of this car was exactly similar in every way to the performance of a car fitted with the sliding gearset and he stated that tests had shown that the economy of this car was equal to that of cars with mechanical drive.

A. M. Day suggested a system of elec-

trical transmission in which the ordinary clutch would be retained but the change gearbox eliminated. One way of doing this would be to replace the flywheel with the motor generator which would supply a battery. With this system when heavy going or steep hills were encountered, the extra torque necessary to propel the car under these conditions would be supplied by the motor which would draw on the energy previously stored in the battery. With a 30-horsepower gasoline motor a 5-horsepower compound-wound electric motor and a 6-volt 100-ampere-hour storage battery would be sufficient. The capacity of this battery would be large enough to propel the car 25 miles without any assistance whatever from the engine and this would be ample to meet all conditions in touring. The weight of such a system would be between 300 and 400 pounds but when it is considered the change gearbox, starter and lighting generator would be eliminated, it is seen that the overall weight of the car would be but slightly increased.

Reversing would be accomplished by changing the direction of the current through the field of the motor. This necessitates the driving of the gasoline motor in the reverse direction also, but this is not objectionable because the reverse would be used a very small part of the time.

Mr. Day suggested a similar system in which the motor generator was separate from the flywheel and in which a clutch would be placed on either side of the motor generator unit. This would eliminate the necessity of driving the engine backwards when reversing because the forward clutch could be thrown out of engagement and thus the electric motor would drive only the rear wheels.

Four-Wheel Drive

The third system of electrical transmission that was discussed was that in which a generator was coupled to the flywheel from which power is supplied to drive motors that were connected to the wheels. There are several of these systems in use, some of which are equipped with a storage battery while others are not. With this system from one to four motors are used for driving the wheels. When one motor is used it is generally located amidship and drives through a differential to the rear wheels. Two speeds

generally are used, these being obtained by putting the fields in series for one speed and in parallel for the other. A more common type is where two motors are employed, one for each rear wheel. In this case also there are two running notches, one of which is obtained by placing the motors in series and the other by connecting them in parallel.

Four-wheel drive is sometimes used with this type of electrical transmission and in this case there is an individual motor for each wheel. A good example of this type is the Couple Gear truck. Compound-wound generators that will give a practically even voltage over a wide range of load generally are used with this system, and the motors are series wound. No clutch is required, as when the motor is running idle, the voltage produced by the generator is not sufficient to rotate the driving motors. In starting a machine of this type, it is only necessary to speed up the gasoline motor.

There was a great deal of discussion on the advantages and disadvantages of this type of transmission. It was maintained by some that its over-all efficiency was low and that the initial cost and weight of a chassis fitted with this type of drive was very high. Others claim that this system was satisfactory when properly designed and it was generally admitted that it offered special advantages where trailers were used.

Weight is a Factor

Mr. R. M. Lloyd stated that the success of this type of transmission was doubtful because of the great weight of the electrical units. He stated that the Fifth Avenue Bus Co. had had several machines in operation for several years and that it was found that if the generator and the motors were large enough to take the full engine power they were too heavy and costly. On the other hand if the electrical end was brought within the weight requirements it was not capable of transmitting the full engine power. It was found in this case that the gasoline electric busses would not accelerate as rapidly as those equipped with sliding gearsets, and that this was a great objection in bus work. He also said that these busses required 25 per cent more gasoline than the other type and that maintenance was almost as great as with the mechanical drive designs.

L. G. Wilson, who has had a great deal of experience with the Fisher electric transmission, stated that he believed that while the efficiency of this system was lower, the performance of the engine was better and also that the success of a gas-electric design depends entirely on the proportioning of the parts. He said that one of the great reasons why the Fisher system had not been more successful was due to the fact that the drivers would not give the batteries the attention they deserve. He believed that there was no need for a gas electric design in trucks of less than 3-tons capacity with the exception of the Entz machine.

Fool-Proof Feature

Mr. Hexter, maker of the Hexter trucks, then gave his experience with trucks of various types and explained why he was in favor of the gasoline-electric type. He said that the most important feature in truck construction was the elimination of the human element and that he believed that there was less likelihood of a careless driver injuring a truck of this type than one equipped with a mechanical drive. He said that while in the early days the gas-electric truck was inferior to the mechanical type, this was not so now and there are a great many gasoline electric trucks that are showing a better performance than the mechanical type now. He said that while the latter

would show less gasoline consumption on a smooth, level road, and under practical conditions of operation the economy of the electric type was better.

He said also that the gas-electric was much easier on tires, the Tillings Stevens Co. of England, maker of buses, guaranteeing 14,000 miles on a set of tires. He also brought out the point that there was a great saving in transmission lubricating material, as with the electric drive, oiling was necessary but once a year, while with the sliding gearbox at least 30 pounds of grease were required every month. Another point in favor of the gas-electric drive is that no brakes are required in ordinary running and therefore there is no wear and tear on these parts, braking being accomplished electrically.

In support of his arguments that the maintenance of the gas-electric truck is less, he quoted the following figures for buses of different types in operation in New York, Paris and London:

City	Motive Power	Type of Drive	Cost per mile
New York	Gasoline	Sliding gear	41 cents
Paris	Gasoline	Sliding gear	21 cents
London	Gasoline	Sliding gear	17 cents
London	Steam	Mechanical	16 cents
London	Gasoline	Electrical	14 cents

Another point brought out by Mr. Hexter was ease of operation of the gasoline electric truck, stating that speed could be varied from $\frac{1}{8}$ mile per hour to 10 miles per hour in 10 seconds.

Manufacturers' Communications

USED CAR AS BY-PRODUCT

INDIANAPOLIS, Ind.—Editor Motor Age
—There is a great by-product of the big motor industry that the general public heretofore has not taken serious cognizance of, but which, with facts fairly considered, is the means of giving to hundreds an opportunity to purchase a real fine car at surprisingly low costs.

This opportunity is presented to those who desire to own a car, but who do not want to purchase a new one of a certain price, possibly because it is not large enough or various other reasons, by investing anywhere from \$600 to \$1,200 in what generally is known as a second-hand reclaimed car. As a matter of fact, the average reclaimed car is nothing more or less than a very fine motor car right in its prime of life and with only 10 per cent of its real energy used.

In the garages of the reputable dealers of this city today expert mechanics are putting into first-class shape by overhauling, putting on new coats of paint, new tops, fore-doors, etc., some of the best "buys" that could be offered to the public. Many of these machines have been run only from 6,000 to 8,000 miles. They are in better shape than when they left the first dealer's hands, unfounded

statements that their sale is not a ready one, notwithstanding.

Heretofore the car manufacturer with his organization only has given serious attention to the manufacture, sale and service of new cars. But nowadays the real wide-awake manufacturer is branching out further, giving the motor car business general scrutiny.

I have been giving the used car question serious consideration, believing that the dealer who puts his reputation behind a used car that he disposes of, knows the value is there, but is not thoroughly able to convince the purchasing public.

There are approximately 300,000 cars built annually. Statisticians figure that the life of a good car is between 80,000 and 100,000 miles, reliable and smooth-running. The statement is being proven daily, for there are any number of 1910 cars running in numerous parts of the country that have from 70,000 to 80,000 miles on their speedometers and today are good, smooth-running cars giving excellent service.

The average user drives his car about 7,000 miles annually. At the end of that 7,000 miles pressure from the family circle and personal pride on the part of the

owner impels him to turn his old car into the retail dealer for a new one. This car then generally is classed in motor slang as a "piece of junk," when as a matter of fact, it only has really started out to economically and successfully perform the real work of its life.

If a Cole dealer gets this car he turns it over to his expert mechanics. At a small cost, maybe \$150, it is put in first class shape and then put in the used car department for sale.

Just because there is a slang phrase "a piece of junk," the buying public shys away from the best motor car bargain it is possible to get. It has been said that if it was left entirely to the woman to buy the car, she would use her bargain instinct and get this great value. The used car having been properly worked in, its mechanical whims corrected at the expense of the first owner, the new owner of this used car has small operating expense and has entirely eliminated the shrinkage in value.

I can cite the case of a dealer who had seventy-three used cars, either in process of overhauling or ready for sale. The dealer was asked to figure a conservative estimate of the number of service miles left in these seventy-three machines. He made it low, 700,000 service miles. His total investment in the seventy-three cars was \$30,000. The original cost he figured at \$150,000. The depreciation which the original buyers of these cars had stood on the entire seventy-three cars was approximately \$120,000, or 80 per cent of the original cost.

My analysis shows that it is here the great discrepancy occurs, and which is of tremendous interest to the motor industry. While these cars had suffered a depreciation of approximately 80 per cent, there had not been expended to exceed 10 per cent of the actual number of service miles of which these cars were capable. This, therefore, constitutes the great unrealized by-product of the motor industry. The unit of measurement whereby the value of all automobiles is determined is the service mile.

Car Still Valuable

We have heard a great deal of talk about the solution of this used car problem. We realize that no man ever wore out a good car. We realize that after a car has been turned in as a used car to one of our representatives, that not to exceed 15 per cent of its possible efficiency has been lost. We also realize that the remaining 85 per cent efficiency of a good used motor car is vastly more valuable to the man who wants a motor car, mainly for actual transportation, than the original value of one of the new cheaper cars.

We have, therefore, encouraged our dealers throughout the entire country to install adequate service departments wherein the used car can be reclaimed.

People wonder where the used car goes. The reason they cannot answer this ques-

tion themselves is because big organizations, like the Cole dealers, are so deftly rebuilding these used cars that the public does not recognize a used car when it sees it running on the streets. There is no more reason why a car at the end of 2 years should be regarded as senile than for concluding that a man at 32 years of age has fulfilled his usefulness. The average good car at the end of 2 years has merely settled down to the place where its working parts are perfectly co-ordinated.

When you stop to analyze it there is little, as a matter of fact, real wear on the part of a motor car which is properly built in the first place. The time will come when a buyer approaches a reputable retail dealer on the subject of buying a used car with as much commercial confidence as he now approaches the same dealer with respect to new motor cars. The personal confidence which the user puts in him is the real asset of every successful retail dealer.

People are going to learn that there is no stigma connected with driving a used car, provided good business judgment has been exercised in its purchase.—J. J. Cole, president Cole Motor Car Co.

LAMPS FOR FORD CARS

Cleveland, O.—Editor Motor Age—In going through the February 19 issue of Motor Age I ran across the reply to a subscriber in Napoleonville, La., with regard to the headlamps on his Ford car burning out. You outlined a system in which the bulbs are connected in parallel and have 12-volt filament. You probably know that we build spark coils for the Ford company and we have here at the factory several Ford flywheel magnetos which are used to furnish current for these coils on their final test before being shipped out.

One of these magnetos we tested out for variation in voltage and amperage at different speeds and we thought it might be of interest to you to know some of the results. At the ordinary cranking speed of 250 to 300 r. p. m., the Ford magneto will generate about 9 volts and 1½ amperes. The output of the magneto gradually increases with the speed up to about 1,200 to 1,500 r. p. m. at which point the indicated pressure is about 16 volts and the current 3 amperes. Beyond this speed the output of the magneto is practically constant because its magnetic field is fixed and invariable. Therefore when the current output is reached it does not increase with the speed above that point because the field cannot increase.

Magneto Output Varies

The average coil system is regulated to draw about 1 ampere of current and as this is practically a steady load on the magneto at all times there is an excess of current mounting to about 2 amperes which can be used to operate headlights. All Ford magnetos vary more or less in output due to several conditions, some being stronger and some weaker than the average. The secret of success, therefore, with

the lighting outfit is to have the bulbs of just the right amperage to come up to full candle power when they are using all the excess current that is not required for ignition.

We advocate using two 6-volt 2-ampere tungsten bulbs connected in series. We have found by exhaustive test that this arrangement gives longer life and better service. In the first place, a 6-volt filament is shorter and has a heavier cross section than a 12-volt filament. Therefore, the bulb itself is less liable to break from the vibration of the car and it will stand a greater proportional overload without burning out.

If it is found a 2-ampere bulb will not meet the requirements, that is, it burns too

brightly at high speed, a 2¼-ampere bulb can easily be substituted, while on the other hand if the magneto is a little weak a 1¾-ampere bulb can be used. Where bulbs are used in series it is necessary that each draws exactly the same amount of current. Otherwise they would not burn with the same brilliancy. With bulbs connected in parallel this is not so important. In a series system if one bulb happens to burn out, the circuit is broken and the other bulb is protected while in a parallel system if one bulb burns out the full load is thrown on the other bulb, burning that out also. We think you will see from this that the series system would work out to best advantage.—L. E. France, Service Department, K-W Ignition Co.

The Motorists' Bookman

Motion Picture Making

THE movie fan, be he of the 52nd degree or of a lower order in the movie free masonry, should find much that is instructive and entertaining in this book by John B. Rathbun, associate editor of "Motography" and instructor in machine design in the Chicago Technical College. Some chapters, devoted to the workings of the motion picture camera and projector, are technical; others, dealing with the studios, actors, trick films and the preparation of the scenario, are what might be termed "light reading." There is one chapter on the motion picture theater and the promotion of this form of

entertainment, another on the conduct of the show and a resume of the municipal ordinances in regard to censorship, fire protection and ventilation of the theater and a third on the various methods of coloring films. A perusal of the book cannot help but add to the enjoyment of viewing a "Kathlyn" or "Broncho Billy" film. "Motion Picture Making and Exhibiting" is published by Charles C. Thompson Co., Chicago.

The Gasoline Automobile

The second volume of the "Gasoline Automobile," by P. M. Heldt, is announced. This book takes up gearsets, control, transmissions and the details of the running gear. The author has aimed, as in the first volume, to supply information which will enable the man already familiar with the motor car and its parts to gain a better insight into the methods of construction and operation and gives him a keener sense of comparison. The author assists by comparing the different types of drive, steering, gearsets, etc., and goes into the methods used in testing these parts and the formulae adopted for measurement calculations. This, and the first volume, which treats of the motor only, form a complete treatise on motor car construction. Published by the Horseless Age Co., New York.

The Spell of Switzerland

A book of travel masquerading in the guise of fiction, Nathan Haskell Dole's "The Spell of Switzerland" is instructive without being dry and as entertaining as the average novel prescribed for "hammock reading" in July and August. The author knows not only the beauty of Switzerland but its history. He mingles excellent description of mountains and lakes with entertaining anecdotes of Calvin, Voltaire, Rousseau and Gibson and points out for the benefit of the reader historic landmarks, cathedrals and castles. The book is from the press of L. C. Page & Co., Boston, Mass.

AMERICAN CARS IN EUROPE

Since the publication of its international edition in French, Motor Age has since a number of inquiries from European firms who desire to handle lines of American cars. Some of the more general ones will be published in these columns from time to time, and it is suggested that the manufacturers of cars which answer their requirements communicate with the inquirer.

From France

Beaune, Cote-d'Or, France—Editor Motor Age—Will you kindly refer to me builders of runabouts or small cars of 8 or 9 horsepower of two or three passengers? What I want to find is a style of runabout that I can resell to the trade in France at \$500 to \$600, fully equipped with top, windshield, lighting apparatus and tools. Hence the purchase price for me must be a good deal lower than the ones given above, owing to the duty, transportation expense and profit, to net on each runabout. You could perhaps turn over my address to builders of cars who advertise in your magazine.—L. Reblin, 4 Faubourg Bretomiere, builder and wholesaler of bicycles, motorcycles and motor cars.

From Belgium

Brussels, Belgium—Editor Motor Age—Kindly have addressed to me a few catalogs of factories that turn out motor cars ranging from \$800 to \$1,000.—F. Anderheyger, Rue Breydel 50.



Cyclecar Development

Cyclecar Efficiency and How It Is Obtained

By William B. Stout

CYCLECAR makers are claiming great things for their cars. They claim wonderful mileages, and wonderful speeds; they make statements as to performances on country roads, and state that with small air-cooled motors they pass big 40-horsepower cars. If even a part of the claims are true then there is certainly something to the simple-type cyclecar, but there must be an engineering basis for the result if it is there. Why then is a cycle-

fairly well understood. The nearer in line the wheels of the car are placed the less side action there is when a bump is hit with one front wheel, and the less tendency to spin the car. In other words, more of the motor power is expended in propelling the car forward and less in side thrust. This is true in all treads up

this section are over 2 inches high. These, however, are many in number, thousands to the mile, but they can be ignored so far as riding comfort is concerned if the car has resilient springs. The wheels will dance about like mad, but the moves are so small that there is little or no reaction into the car.

The cyclecar, however, in passing over the rough clay and small bumps must iron out its own road, and hence should be designed with the weight very low so that the car will mount obstructions with the smallest power consumption. How low center of weight affects this power consumption is shown in Fig. 2. The upper car shown, built low, strikes the road obstruction on a line from the center of gravity to the point of contact of wheel with bump as B-C. This line resolved to its elements shows B-D as the forward thrust line and C-D the proportionate amount of power needed to overcome the bump.

The lower drawing shows a high-built car, the line of thrust being C-D. This resolved shows that the line B-D is shorter and the vertical or lift line longer. Hence the higher car takes more of the total motor power to lift it over the bump than the low car. Proof of this is seen in the performance of long low cyclecars which can mount an ordinary curbstone from standing start with the wheels resting against the curb edge.

By adopting both the low-weight line, and the narrow tread, the greatest possible amount of power of the motor is

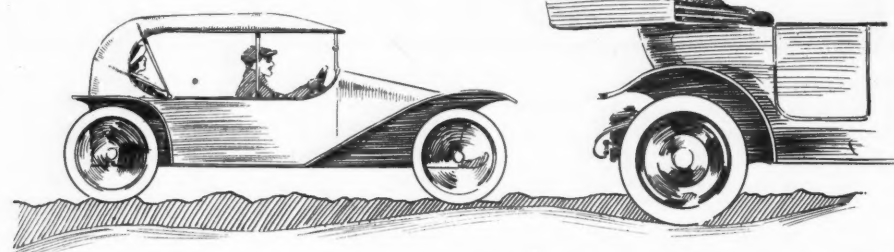


FIG. 1—THE STANDARD TREAD CAR MEETS A DIFFERENT ROAD CONDITION FROM THE NARROW TREAD CYCLECAR

car so efficient, and why these performances?

Some makers, building to ideas of previous practice in construction, have lost sight of the basic efficiency ideas for a road vehicle, and hence in spite of more efficient power plants and transmissions perhaps have not been able to get the results expected and have had to go to higher horsepower and weight to get the performance, thus getting above the cyclecar class.

Others have figured that the layout of the car itself and its weight and tread arrangement were more important than the motor or transmission type, and have built narrow and very low. They have been surprised at three things: first, comfort, even on the worst roads; second, speed, with a small air-cooled motor; and third, the sales deluge. The public wants performance and appearance, and these factors being present, with low upkeep cost apparent, the rest has been easy sailing.

There are several factors which are inherent in a cyclecar design which have a very direct influence on the speed possibility with a given motor design. The road efficiency of a cyclecar is much more important than transmission efficiency, and road efficiency can only be obtained to the extreme by applying scientific laws to constructions. A cyclecar must be built low, and with light weight must have narrow tread. Wider treads need greater power.

The effect of narrow tread on power consumption has been discussed and is

to 56 inches, standard, the wider the tread the more power needed to drive the car, though at 56 inches a new factor comes in as the road conditions then are different.

A standard-tread car meets road conditions entirely different from the narrow-tread cyclecars. With standard tread, the road is rolled down in front of the car very largely, and the machine runs in ruts with few small bumps. This road is a succession of waves or rolls of greater or less frequency and amplitude—these often being 3 or 4 inches deep but with no sharp angles or bumps, as shown in Fig. 1. For this kind of

running the springs must be fairly stiff and have great amplitude of action.

The cyclecar of narrow tread does not meet these rolls as a usual thing, but runs between the ruts. One naturally thinks that here is the roughest part of the road, because it is not smoothed down as a floor. But this part contains few bumps of any amplitude, the greater part of the roughness being small stones, hard clay and the like. Very few bumps in the average country road in

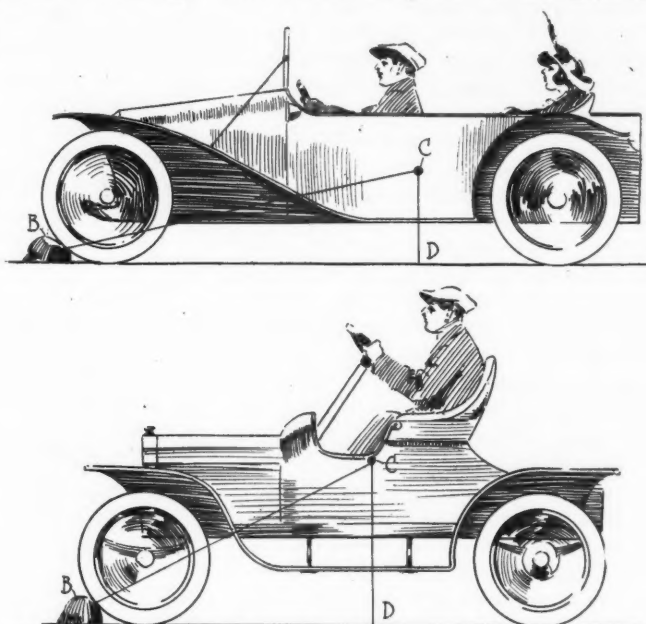


FIG. 2—THE LOWER THE CAR WEIGHT THE LESS POWER IT WILL TAKE TO DRIVE IT OVER BUMPS

expended in forward thrust and the least in lifting and side thrust. This is why the 36-tread tandem cars are able to run at speed and with power to spare using a small air-cooled motor whereas a wide, high car like the old Brush cars, must have more power in order to perform well.

The engineer seeking to make a car of maximum efficiency and comfort cannot ignore these points or he will not get performance without having to add weight and horsepower.

The wind resistance factor has been explained previously, and is important. That of road efficiency, however, always operates, whether in windy weather or in calms, in mud or on dry pavement. The cyclecar must have every factor of rational engineering to back it and then, and then only, will it obtain the maximum results for the minimum of output and cash.

COUNSELS AGAINST HASTE

While makers are hurrying to produce cars that are built right, dealers are trying to force early deliveries. It takes a year at least to develop a car, even if it is a cyclecar, and to expect cars to be delivered within 5 or 6 months of the building of the first car is to display ignorance of the manufacturing industry. Few cyclecar makers will be delivering before April, and June will see the first cars of many more, but once started things will go fast. Dealers will profit by not hurrying the factory

facture. The public in general reached the same opinion through the publicity given to the coming cyclecar industry by the trade papers and by the daily press of the country.

"As a consequence, the buyers have been after the dealers and the dealers are hot on the trail of the manufacturers and pressing them so hard that I am afraid that many of our makers will rush into the market with cars that will not be a credit to the industry. Many of these early birds will live to regret their action, for it takes just as long to complete a cyclecar model and to place it upon the market as it does to complete a new model with one of the big-car manufacturing companies. Some of these companies have had their 1915 models on the road for some time in hard tests.

"Yet the public and the dealers believe that a cyclecar maker should announce his entry to the cyclecar field and be ready for deliveries within a few weeks at most. As a matter of fact it takes longer to put

cyclecar on Bedelia lines, having 105-inch wheelbase and a 36-inch tread. It is fitted with a Spacke twin V motor, and planetary gearset driving by chain to the front axle. The hubs are fitted with universal joints to allow steering action.

The car is hung on cantilever springs fore and aft, while the body has high sides for dust protection, and has the brakes working on belt pulley rims on the rear



THE MORSE CYCLECAR

wheels and also on the front wheel drive as in foreign motorcycle practice. A speed greater than 40 miles per hour is claimed for the car and a gasoline consumption of about 1 gallon for 40 miles.

SAGINAW HAS SPECIAL MOTOR

Latest among the new cyclecars is the Saginaw, made by the Valley Boat and Engine Co., Saginaw, Mich. The motor is one of the company's design, is of the conventional two-cylinder V air-cooled type, made especially heavy, however. The bore is 3 3/8 and stroke 3 3/4. The valves are in the head and are 1 1/4 inches in diameter. The pistons have three piston rings instead of the customary two.

From the coupling back to the outside flywheel or the friction disk is a 1 1/4-inch diameter heavy wall steel tube. The disk is located underneath the seats and is supported from a cross member and by a self-aligning annular ball bearing. The thrust of the friction is taken by a large self-aligning thrust bearing. The jack-shaft is 1 1/4 inches in diameter and carries a 14-inch friction wheel which is shifted by a lever.

The gasoline tank has a capacity for running approximately 150 miles and is located in the cowl. Direct steering is used through rods and a 16-inch diameter hand-wheel. The front axle king bolts are so hung that the road shocks are not transmitted to the handwheel and the car steers as easily and as well as any large car. One feature which is made possible by the way the axle hangs is that after rounding a corner the driver can remove his hand from the wheel and the front wheels will straighten up. Equipment includes top, storm curtains, ventilating windshield, electric horn and three electric lights with headlights imbedded in the fenders.

The company is starting through a production of 1,000 cars and expects to deliver at least 25 cars next month.



THE NEW SAGINAW CYCLECAR IN A SNOW TEST

men and forcing them to produce cars not completely developed.

"There seems to be a notion throughout this country that cyclecar manufacturers can do that which no motor car manufacturer has ever been able to do," writes J. P. La Vigne, of the La Vigne Cyclecar Co., "and that is turn out a car within a few weeks or months even after announcement of his intention to manufacture. We of the cyclecar business have been most unfortunate in many ways. The interest in the cyclecar industry has developed so fast that manufacturers have been unable to keep pace with it. Dealers all over the world presumably thought that the cyclecar makers were ready for business, reaching this opinion through the far too early announcement of their intentions to manu-

out a successful cyclecar, light car or small car of the cyclecar class than it does to put upon the market a brand new type of big car, for every part of the cyclecar must be especially constructed, and after the model has been tested and brought to a state of perfection there is yet a vast amount of work to do to prepare the blue prints, arrange for the material, all of which must be made to pattern owing to the non-standardization of the cyclecars as a class, and arrange for the accessories."

MORSE HAS FRONT DRIVE

The Morse cyclecar, announced by the Morse Cyclecar Co., 520 Lang avenue, South, Pittsburgh, Pa., is built on a new plan, the power driving the front wheels instead of the rear. Otherwise the car is a more or less standard type, tandem-seater



The Readers' Clearing House



HOW TO GET CAR OUT OF THE MUD

Methods Also Given for Extracting Car Out of Sand by Its Own Power

BUTLER, Mo.—Editor Motor Age—Illustrate with drawings the best way to get a car out of a mud or sand hole without resorting to the "team of mule" method.

2—Are leakproof piston rings absolutely leak proof, or only theoretically so, and if placed in exchange for those now in use, would it be necessary to use all leakproof or would one or two to each piston give satisfactory results. If so, where should they be placed, at the top or bottom?—Car Owner.

1—Experience has shown that for sand, the use of ordinary oat sacks is excellent. These sacks, perhaps three of them, are tied around each rear wheel as shown in Fig. 2, forming lumps on the wheels. The car is thrown in gear and the clutch engaged quickly. This method has been tried by a number of tourists, among which may be mentioned road scouts, with great success. Another method, but one which requires more work, is to get two planks of wood and place one under each wheel as shown in the illustration. The planks should be placed as far under the wheels as possible. The work may be made easier by jacking up the wheels, but this is not possible always. In using the jack where the axle is only a few inches from the ground, dig a hole and place a brick or a block of wood at the bottom. Then place the jack on the block. With the planks under the wheels one or more men should push the car while a third does the driving. The motor should not be raced and the clutch should be engaged slowly. Some resort to the method of simply deflating the tires.

The best way to get a car out of a deep mud hole if no hub drum is fitted is to get a team of horses. However, a method which has been used with much success, consists in placing the tire chains on both wheels and then winding rope around the tire as shown in the illustration. The use of a hub drum is advisable and there is

no reason why motorists should not carry some such device in their cars when it is known mud and sand will be encountered. A hub drum is a device attached to the hub of a wheel as shown in Fig. 3 and to which is fastened a rope, the other end of which is fixed to a stake some distance from the car. When the wheel begins to spin the rope winds upon the drum and the car, by its own power, comes out of the hole.

2—The makers of leakproof rings, a number of which are on the market, claim the compression will be increased considerably, due to the prevention of gas leakage. Motor Age has not experimented with any of these rings and therefore cannot say whether they are leakproof in every sense of the word. A number of owners have stated they have obtained good results by using but one leakproof ring on each piston. It would be best to have all the rings of the same type.

SUGGESTS THREE-CYLINDER MOTOR

Would Such an Engine of Four-Cycle Type Do?—Not for Large Cars

Orangeburg, S. C.—Editor Motor Age With the present growing demand for small motors of from 10 to 15 S. A. E. horsepower for small cars, so-called cyclecars, and the like, the difficulties in the way of manufacturing the smaller four-cylinder motors, and the short comings of the two-cylinder vertical, it seems to me that three-cylinder motors, with a bore of from 3 to 3½ inches, would be interesting propositions to designers, manufacturers, and car makers, provided the three-cylinder motor is itself free from serious mechanical faults.

The two-cylinder vertical motor gives a power impulse for every 360 degrees of crankshaft revolution, but the impulses are either unevenly spaced, or the motor

is unevenly balanced. These defects are not present in the four-cylinder engine, in which a power impulse occurs regularly every 180 degrees; but four-cylinders mean four sets of valves, four series of boring and polishing operations, and, in the smaller sizes, parts of such small size that manufacturing difficulties and breakage, particularly of piston rings, are serious factors.

A four-cylinder motor, of 14.4 S. A. E. horsepower has a bore of 3 inches, and 3 by 4 or 12 inches of its length is required for cylinder bores. There are three walls between cylinders. A three-cylinder with a bore of 3½ inches, would have a rating of 14.7 and would have two walls between bores, and would be 1½ inches shorter than the four.

Even with a rather large bore, say 3¾ inches, and a long stroke, a three-cylinder motor would not require more than two generous crankshaft bearings. The crankshaft would have probably less whip at high speeds than that of the small four with two bearings. Manufacturers of light six motors having cylinders cast in blocks of three should not have much difficulty in adapting their castings and other parts to the needs of the three. Ignition could probably be cared for by some of the standard small six ignition instruments. The difference between the firing of the three and that of the four, as evidenced by the ear, would be less noticeable than the difference between a four and a six.

As I see it at present, the principal objection to the three-cylinder type is its limited field of application: namely, for cars calling for from 10 to 15 horsepower, represented by cylinder bores of from 3 to 3½ inches. Even within these limits, however, it seems to me that this type could be manufactured in large lots to sell for considerably less than a four of equal capacity, and that, in the hands of the

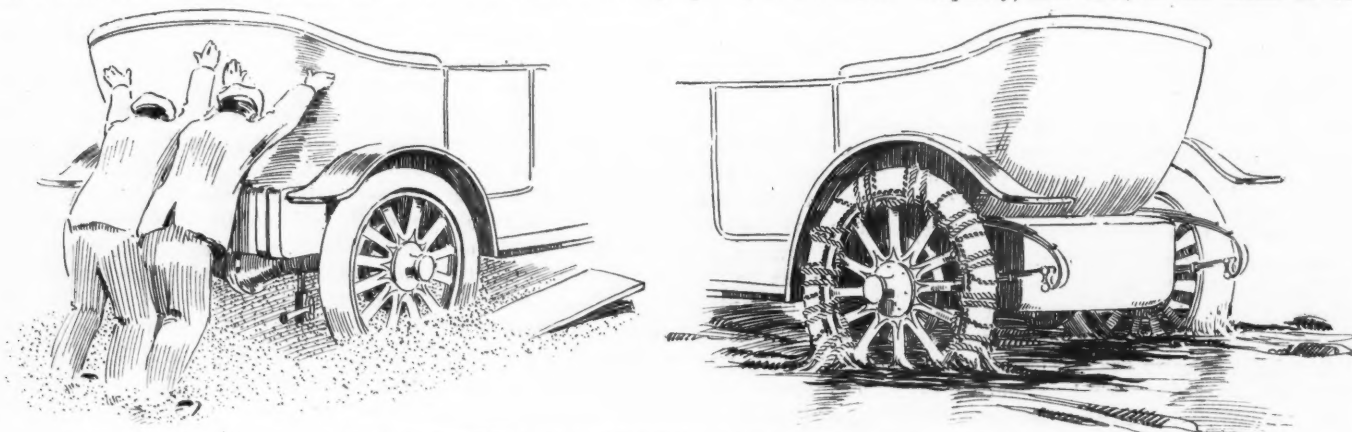


FIG. 1—METHODS OF EXTRACTING A CAR FROM MUD AND SAND

At the left is shown the plank method which is used effectively in sand. A plank of wood is slipped under each wheel and then the car is started with the object of starting the wheels turning on the planks. At the right is illustrated a method of getting out of a mud hole, using chains and rope around both rear wheels. Both systems are described in detail on this page

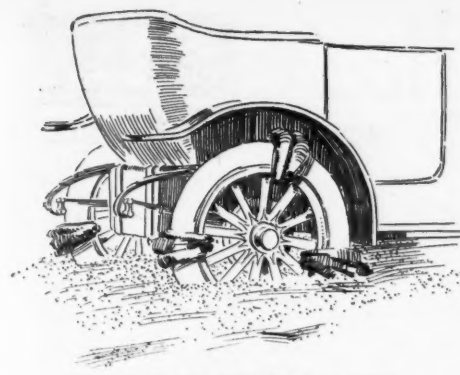


FIG. 2—BAGS FOR USE IN MUD

Strong sacks such as those used for oats are tied around both wheels as shown

user, it would prove the more satisfactory power plant.—A Motor Student.

Motor Age would like to have other readers' opinions of three-cylinder, four-cycle design.

OPINION OF TWO LIGHTING SYSTEMS

Kalamazoo Reader Prefers Electric Lights to Acetylene Type

Kalamazoo, Mich.—Editor Motor Age—I have read several articles in Motor Age lately which have strongly advocated the acetylene form of lighting. These contributors have, of course, a right to their opinions, but their ideas do not seem to change with the times. I used to think that acetylene gas gave a pretty good light. I changed my opinion nearly 3 years ago, when I first drove behind electric lights. These are far superior for showing the road far in advance.

As I am not an owner I have had many chances to compare the two modes of lighting. My chief objection to the gas system is that it is dirty. Most manufacturers put the gas tanks in out of the way places which are hard to get at. The driver must always keep close tab on his tank, or he will have his lights go out on him somewhere in the country. He is never safe without some rubber tubing and extra burners in his car. There is always a possibility that you cannot get a tank when you want it and have to drive in the evening.

Some say the rings of the electric rays hurt the eyes. I am sure the flickering of the gas flame reflected on the road is just as bad. Once, while driving a Michigan car equipped with electric lights, the lights went out, but I found that somebody at the factory had connected the generator wrong, causing a drain on the battery. I have driven Cadillac cars ever since they adopted electric lights, and so far I have never had any trouble.

As the electric systems are now being applied, with the same care as you would use in wiring your house, all wires conduited and in some cases with the one wire system, little wiring trouble need be expected.

The electric way is the surer, safer, and is more convenient than the gas. With

the slight care any electric system needs the owner should expect no trouble.—R. S. Clark.

ROTARY VALVE MOTOR SUGGESTIONS

Formula for Valve Timing Given—Mounting of Carbureter

Kempton, Ill.—Editor Motor Age—Would the effect be appreciably bad on a rotary valve bearing and how much power would it consume by the friction of the valve in its bearing under compression of 75 pounds per square inch, the slot in the cylinder head being 2 inches by 3/4 inches wide approximately and the weight of the valve itself being not over 4 or 5 pounds, as it is to be hollow?

2—Would it not be feasible to mount the carbureter at the rear of the cylinder casting, and admit the gas directly to the hollow valve, the exhaust passing through a passage in the valve.

3—Would the front cylinder, having to draw the gas about four inches farther than the rear, be affected?

4—Would the passage for gas be large enough after the exhaust passage was put in the valve, its outside diameter being 2 inches, the slot being 3/4 inches wide clear?

5—In timing the valves on the exhaust, would it not be proper to have the edges of the exhaust slot and cylinder slot register at the bottom dead center. Open the widest two half way up and close at top dead center, at which point the edge of the intake slot and cylinder slot register, open to the widest half way down and close at the bottom dead center? In motors of which I have read, the valve timing, the exhaust is open when the piston starts on the suction stroke and the intake is not yet closed when the piston starts on the compression stroke. It seems that this would cause a loss of efficiency all around.—C. B. Kelghin.

1—This is mainly a question of oiling. If the surfaces can be kept well oiled they will not stick or cut, but the part exposed to the explosion would have to be watched closely. The friction effect, given the correct oiling, would be negligible on account of the small pressure per square inch.

2—Using a complicated shape for the valve might give trouble through uneven warpage, due to the heat in one passage and the cooling effect in the other.

3—The cylinders would hardly get equal charge.

4—Since cylinder dimensions are not given, an answer cannot be given. You can figure the speed of the gas through the opening left in the valve by assuming the piston speed and the volume swept by the piston per minute.

5—The motors of which you have read are timed right. Close the exhaust and open the intake about 15 degrees beyond top dead center. Open exhaust 30 to 45 degrees before bottom center. Close intake about 15 degrees beyond bottom center.

OVERCHARGED BATTERY HOPELESS

Plates Buckle—Wants More Light From the Headlights

Harlington, Texas—Editor Motor Age—I have a 1913 Cadillac and would like to have more light from the headlights. The car is equipped with the Delco system.

2—When a battery is overcharged what part of the battery is injured?

3—Would a new solution remedy the overcharge?—W. J. Bailey.

1—The Cadillac 1913 is equipped with 6-volt, 18-candlepower bulbs and you could get more light by using 24 candlepower bulbs. Motor Age believes the reason you are not getting enough light is because the lamps are not properly focused. Open



FIG. 3—HUB DRUMS ARE A CONVENIENCE

The spinning wheel will wind up the rope and pull the car out backwards

the lamp door and on top of the reflector directly behind the door is a small nut. This is the focusing adjustment. Take the car out at night and have the headlights directed toward some even black wall, about 50 feet away. If improperly focused the light on the wall will have a shaded portion in the center. The nut should be turned until the shaded portion disappears.

2—The plates and active material are injured when the battery is overcharged. The plates bend or buckle, as it is called; and the active material becomes soft.

3—When a battery is heavily overcharged there is little hope other than to have an experienced battery man attempt to straighten the plates and replace those that are severely injured, with new ones. The addition of distilled water to weaken the solution helps matters, but only a little.

Gives Advice to Reader

Aurora, Ill.—Editor Motor Age—In answer to A. Subscriber's question in Motor Age February 26 in regard to the Buick model 10, I would advise him to retard the camshaft, as he claims the exhaust valve closes 2 inches early according to the fly-wheel markings. I would not trust fly-wheel marking when timing a motor because they are not always right. I would advise him to find where the piston is at

Questions Answered and Communications Received.

Car Owner.....	Butler, Mo.
A Motor Student.....	Orangeburg, S. C.
R. S. Clark.....	Kalamazoo, Mich.
C. B. Kelghin.....	Kempton, Ill.
C. Norling.....	Aurora, Ill.
W. J. Bailey.....	Harlington, Tex.
R. B. D.....	College Station, Tex.
H. Warfield Lads.....	Burlington Jct., Mo.
A Subscriber.....	Aurora, Ill.
S. W. Wrenn.....	Chana, Ill.
J. B. McQueeny.....	Chicago
C. E. Stout.....	Abernathy, Tex.
F. A. Picher.....	Potlatch, Ida.
J. F. Gifford.....	New London, O.
E. D. Shafer.....	McConellsville, O.
C. D. F.....	Cedar Rapids, Ia.
L. A. Nelson.....	Danville, Ky.

No communication not signed with the reader's full name and address will be answered.

sary grind the valve a little to its seat. Clean and polish the valve stem also. The trouble undoubtedly is with the valve sticking. If you cannot adjust the carbureter after the valve has been cleaned and polished, either give Motor Age some more characteristics of the case or take the car to the nearest Locomobile agent. If there is no agent in your territory, write to the agent in St. Louis.

MOTOR MISFIRES AT SLOW SPEED Carbureter Feeding too Much Fuel—Weak Magneto Magnets

Abernathy, Texas.—Editor Motor Age—I have a Ford car which pulls nicely at a speed of say 12 to 18 miles an hour, but throttle it down to 4 or 5 miles an hour and perhaps one or more cylinders will go out and the car will then begin to buck. On opening up the throttle and getting up a little speed, apparently every cylinder will be pulling and the engine running smoothly again. Could there be any trouble with the carbureter feeding gas at low throttle, or does Motor Age think the trouble is with the ignition. I only recently put in new timer wires and there is no short circuit.—C. E. Stout.

It is more likely to be carbureter trouble than anything else. You may have a good running mixture, but one which is not suited for low speeds. Turn the needle valve down a few turns and try the motor for pulling at low speeds. If turning it downward makes matters worse, then turn it back. If you cannot correct the condition by carbureter adjustment, you might look to the valves. See that the clearances are correct, about $\frac{1}{32}$ inch between the tappet and the valve stem. In adjusting both carbureter and valves, the work should be done while the motor is hot. Weak magneto magnets would cause the misfiring at low speeds, but this should be the last thing to decide upon. If the magnets are weak they may be exchanged for new ones at slight cost, by the nearest Ford agent.

Car Bucks on a Grade

Danville, Ky.—Editor Motor Age—Why is it that some cars buck when coasting down a hill with the clutch in, the bucking being so bad that the clutch has to be thrown out?—L. A. Nelson.

The bucking may be caused by excess of play in the drive mechanism. If the motor misfires when going down a slight grade slowly the bucking may be due to the irregular firing of the motor.

NEED NEW HORSEPOWER FORMULA Present One only Considers Bore—More Accurate Method Given

Potlatch, Idaho.—Editor Motor Age—What is the significance of the S. A. E. rating of a gas engine? The two Buick four-cylinder engines are of different power although their S. A. E. ratings are the same.

2—Are not the piston displacements of engines a fairly accurate basis for comparing power?

3—What are the maximum speeds of the Buick B 37 and the Hudson 6-40?—F. A. Picher.

As you probably know, the accepted formula for rating motors—the S. A. E. horsepower formula—does not take into consideration directly the length or the stroke of a motor or the crankshaft speed in r. p. m. However, as originally stated, the S. A. E. formula

did take those two factors into consideration, although indirectly, for the S. A. E. correctly stated is,

$$D^2N$$

horsepower equals — at a piston speed of 2.5

1,000 feet per minute, where

D is the diameter of the cylinder bore in inches;

N is the number of cylinders, and 2.5 is a constant divisor.

As generally used, however, the piston speed figure is omitted and in reality it would take some little figuring to determine the piston speed of any given motor at any given crankshaft speed, and to determine its horsepower at that piston speed as compared with the horsepower found by the S. A. E. formula at the assumed speed of 1,000 feet per minute.

There are a number of formulas which take the stroke and the r. p. m. of the motor into consideration in determining the horsepower. One of these which gives results very close to the actual power of the motor is that proposed by Motor Age. This simply is the S. A. E. formula with the length of stroke and crankshaft speed separated and made factors instead of having them combined in the constant of 1,000 feet per minute piston speed. In fact, this has come to be known as the modified S. A. E. formula. The formula is, horsepower

$$D^2NSR$$

equals — where

$$15,000$$

D equals the bore in inches,

S equals the stroke in inches,

R equals the r. p. m. and

N equals the number of cylinders.

In the examples you mention the two Buick cars have the same bore, but different strokes. The S. A. E. rating for both is the same because the formula takes only bore into consideration, but the powers are different, to be sure.

2—Although displacement in a measure is a means of determining power, it is by no means an accurate method. Design is more important than mere cylinder dimensions. Two poppet-valve motors of the same displacement will not necessarily show the same horsepower on a brake test and it does not follow that a motor of 400 cubic inches displacement has more power

than one of 300 cubic inches. The internal friction of the parts, the cylinder design, the valve timing, spark timing, and the place of spark occurrence all are factors in power output.

Two motors of exactly the same design and dimensions in every particular except displacement will show horsepowers which are nearly proportional to the displacements. For example, one motor has 300 cubic inches displacement and the other 350. At the same speed the latter will show nearly $\frac{1}{6}$ more horsepower than the former.

3—The Buick B 37 can attain a speed of 55 miles per hour and the Hudson 6-40 about 60.

MADE TRACTOR FROM AN OLD CAR Ohioan Now Uses Vehicle for Stationary Work—Cost \$30

New London, Ohio.—Editor Motor Age.—Fig. 5 shows a light tractor made from a Reo chassis, hitched to a road drag. I dragged about a mile of road all through the summer whenever it was needed and did not get enough money for it to even buy gasoline, but it was a pleasure to travel over a road that would not throw a person off the car seat.

The cost of this tractor was less than \$30 outside of my own work, and as I have since put on a set of governors I can use it for any stationary work not requiring more than 5 or 6 horsepower. It runs just as steady as a steam engine and during warm weather I use kerosene with very good results, not making any carbureter change or using any hot air pipe.

If any readers would be interested in building a tractor from an old car, I would be glad to tell them what I have learned.—J. F. Gifford.

ADVISES A TROUBLED MOTORIST Says Sticking Valve Caused Misfiring—Greases the Stem

McConnellsville, O.—Editor Motor Age—I noticed in the February 19 issue of Motor Age an inquiry from Salina, Kan., regarding faults in a Studebaker 25. I supposed it to be a 1913 model. I have the same car and almost the same trouble.

I found that when I had a misfire, and the compression was poor, the trouble was in the valve stems sticking in the guides. To prevent this, I put some differential grease on the stems about every 500 miles. The garage men have wanted to cut down the valve stems with emery, but I would not allow them to do it, as the valve stems undoubtedly will become worn after a time and the trouble cease. The grease on the valve stems prevents the sticking and give somewhat quieter valve operation.—E. D. Shafer.

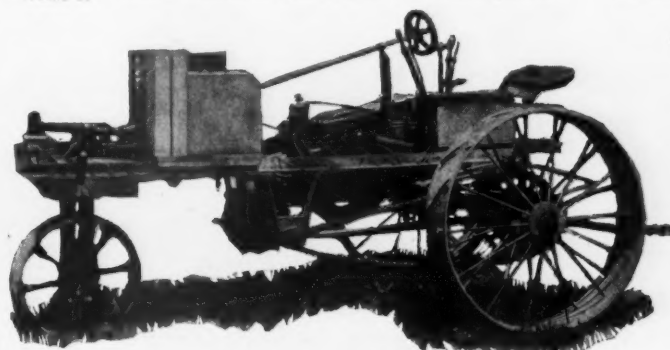


FIG. 5—TRACTOR MADE FROM OLD REO
Cost the builder \$30 outside of labor and is used for work requiring about 6 horsepower

The Accessory Corner

Hoyt Magnetometer

AN electric meter which tells at a glance the condition of the Ford magneto has just been brought out by the Hoyt Electrical Instrument Works, Penacook, N. H. The meter is permanently connected to the magneto and fastened to the dash and indicates the condition of the magneto, whether it is in good, excellent, medium or poor shape. These words are represented by the letters P, M, G and E on the face of the meter, which is shown in Fig. 2. If the motor is misfiring at 20 miles per hour and the indicating hand points toward P, the driver is notified that the magneto is in poor working order. It has been found by experiment that at 8 miles an hour the hand will point toward P, between 10 and 15 toward M, between 18 and 25 toward G and above 30 miles per hour toward E. If the hand points toward M at 25 miles per hour, then the magneto is out of order. The instrument may be installed by any owner from the instructions given by the maker. It sells for \$4.

K-W Lock for Fords

The K-W Ignition Co., Cleveland, O., has added a combination lock and ignition switch for Ford cars to its line of accessories, the newcomer being equipped with a Yale lock and utilizes the key for a plug. The key, when inserted and turned to either battery or magneto side, makes the motor operative but when removed while in the off position the ignition system is

locked and the motor cannot be started even if the screws holding the switch are removed. Another feature of the new lock is that it is installed easily in 10 minutes with a pair of pliers. The lock shown in Fig. 4 may be brought separately or will



Fig. 2—Hoyt magnetometer for Ford cars which is permanently installed on the car and tells at all time the condition of the magneto, whether poor, medium, good or excellent

be furnished as regular equipment with the K-W master vibrator.

E-Z Rim for Ford Cars

A quick detachable rim for Ford cars which is simple in construction and which may be fitted upon the old wheels is announced by the E-Z Rim Co., Boston, Mass. The E-Z rim comprises a removable clincher ring, R in Fig. 1, upon which the retaining lugs L are attached. The ring is slipped in place so that the holes in the lugs fit over studs S on the wheel. Nuts are then screwed upon the studs to hold the ring in place. It appears that the simplicity of the E-Z rim is its main feature, for all that is necessary to remove the tire is to unscrew six nuts, thus releasing the ring and making the tire bead free. The lugs being integral with the ring, it is certain they will not work loose. For convenience a brace wrench is supplied to make the removal of the nuts easy, but an ordinary wrench will do the work. The maker states any garage can attach the rims in a short time. A set of four, using the old Ford wheels, sells for \$15.

Artillery Tire Protector

A tire protector which is made up of a number of 3-inch sections is announced by the Artillery Auto Tire Protector Co., Pittsburgh, Pa. The protector is made of sections, one of which is shown in Fig. 1, this protector being of rubber fabric faced with leather. These units are applied around the tire and are held in place by a continuous wire cable, as shown in the illustration. When installed there is no



Fig. 1—The upper illustration shows the Artillery tire protector, which is made in sections. The lower shows the E-Z rim for Ford cars. The lugs L are integral with the ring and fit over the studs S on the wheel



Fig. 3—The Inland hand pump, which, when folded, is but 15 inches long. The pump is attached to the running board as shown at the right

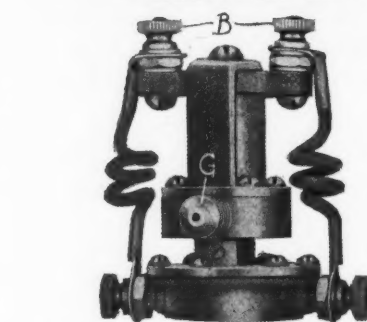
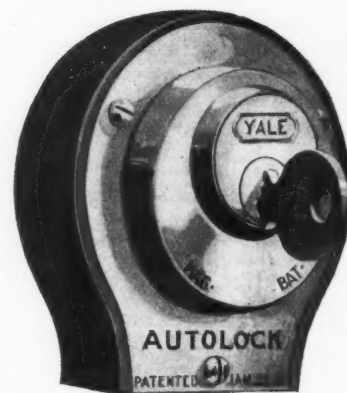


Fig. 4—The upper illustration shows the K-W Autolock for Ford cars. The device incorporates a Yale lock and utilizes the key as a plug. At the bottom is shown the Sure-Start electric vaporizer, which is operated by a storage battery

interference with tire changing, it is claimed. The protector sells for \$17.85 for the 34 by 4-inch size.

Sure Start Vaporizer

A simple electric vaporizer for assisting in starting the motor is being marketed by the United Motor Equipment Co., Chicago, under the name of Sure Start. By turning a switch on the dash of the car, fuel is made to pass through the vaporizer and at the same time current from a battery passes through a heating coil which vaporizes the fuel. With a starter attached the first turn of the motor is said to cause firing. The Sure Start vaporizer is shown in Fig. 4. The terminals B are attached to the battery and the nipple G to the gasoline line. The fuel enters the intake manifold by a union on the other side. The vaporizer sells for \$8.

Inland Hand Pump

A folding hand pump which will inflate a set of Ford tires in 7 minutes, it is



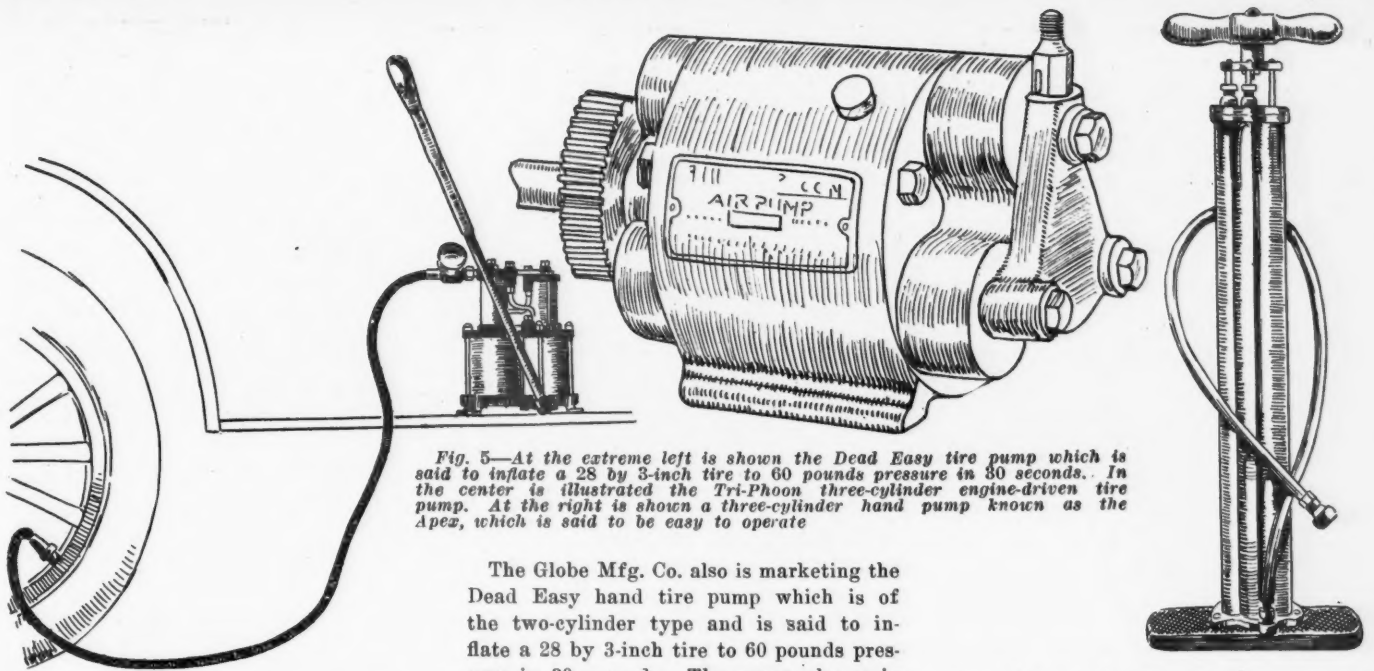


Fig. 5—At the extreme left is shown the Dead Easy tire pump which is said to inflate a 28 by 3-inch tire to 60 pounds pressure in 30 seconds. In the center is illustrated the Tri-Phoon three-cylinder engine-driven tire pump. At the right is shown a three-cylinder hand pump known as the Apex, which is said to be easy to operate

claimed and which has an exceedingly long leverage is announced by the Inland Mfg. Co., Chicago. The pump may be folded as shown in Fig. 3 so that it is but 15 inches long. As the illustration shows the Inland is clamped to the running board by a wing nut arrangement. The cylinder and base are brass, the bore being 3 inches and the stroke $5\frac{1}{2}$ inches and operating within is a cold-rolled piston with leather packing. A decided feature of the pump is that it will not heat, it is stated, owing to a draught of air which flows through the cylinder at each compression stroke. The Inland sells for \$7.50 complete with 8 feet of hose and a pressure gauge. A special type for small cars is in the course of construction and will be announced later.

Mascot Air Compressor

A new garage air compressor is announced by the Jacobson Machine Mfg. Co., Warren, Pa., known as the Mascot. This pump is of the single-cylinder type and is designed to be belt driven as shown in Fig. 6. With a bore and stroke of 3 by 3 inches this pump, at a speed of 300 r. p. m., is capable of delivering $3\frac{1}{2}$ cubic feet of air at 150 pounds pressure. The Mascot is air-cooled and is readily accessible internally by removing the cover plate shown at the left of the illustration.

Globe Air Compressor

The Globe Mfg. Co., Battle Creek, Mich., is marketing a two-staged compressor for garage use which is of the belt-driven type. The compressor, shown in Fig. 6, has two cylinders, one larger than the other. The air is first compressed in the large cylinder, then sent to the smaller one where it is compressed still more and from the small cylinder it passes to an oil trap which cleans the air thoroughly. From the trap the air passes to the tank. Lubrication of the moving parts is by splash which requires replenishing about once in two months. The cylinders are air-cooled and have a relative displacement of 1 to 4.

The Globe Mfg. Co. also is marketing the Dead Easy hand tire pump which is of the two-cylinder type and is said to inflate a 28 by 3-inch tire to 60 pounds pressure in 30 seconds. The pump, shown in Fig. 5, is either clamped or permanently bolted to the running board and with the long leverage obtainable with the handle, hand-pumping is comparatively easy, it is claimed. The pump is finished in nickel and black and with 12 feet of hose and a gauge sells for \$15.

Tri-Phoon Pumps

The Green & Swett Co., Boston, Mass., has recently brought out a three-cylinder pump that is designed to be driven by the engine. The pump is very compact, being 4 inches wide, 4 inches high and 6 inches long and contains three reciprocating pistons driven by a large rotating cam, the pistons being controlled on the cam surface by means of roller bearings. The cam and the roller bearings are made of steel. In place of leather cup washers metal piston rings are used. By the use of the cam construction the crankshaft, connecting rods, eccentrics and gears are eliminated and for this reason it is claimed that the pump will last indefinitely. The pump is installed on the engine by means of a bracket and is driven from any motor shaft. The pump is thrown into action by

means of a clutch. The Tri-Phoon can be run as high as 1,500 r. p. m. although a speed of 800 is advised. It delivers air at 115 pounds per square inch. The price with hose and gauge is \$20 and with gears and fittings for attaching is \$25.

Quality Welding Outfit

A portable, welding and carbon-removing outfit has just been announced by the Gibson Automobile Co., Indianapolis, Ind., which weighs less than 40 pounds and is carried around in a small case. The outfit is used in connection with the standard oxygen and acetylene tanks and requires little gas, it is claimed, to do its work thoroughly.

Apex Hand Pump

A three-cylinder hand pump which is claimed to inflate the average tire in 30 seconds is announced by the Buffalo Auto Accessory Mfg. Co., Buffalo, N. Y. The length of the pump is 22 inches and the cylinders are of seamless brass tubing. The rods are of steel and the pistons of leather. The pump shown in Fig. 5 sells for \$6.

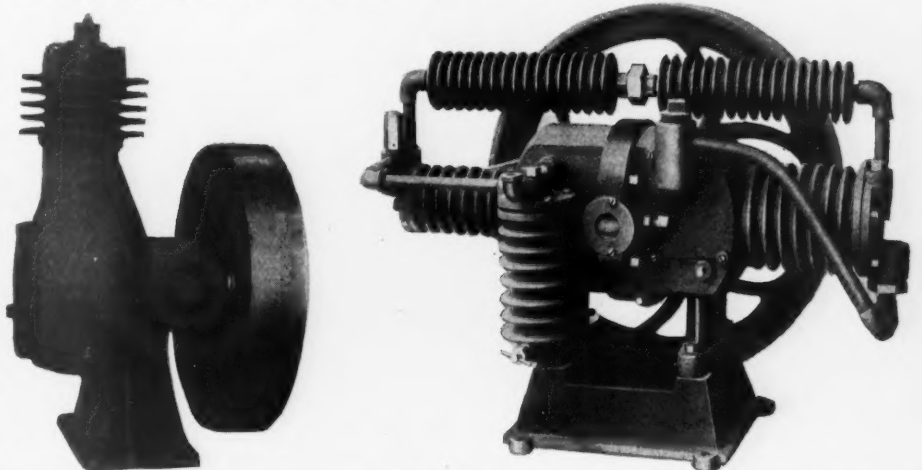


Fig. 6—Two types of air compressors for garage use, the one at the left being a single-cylinder, belt-driven type known as the Mascot and that at the right being of the two-stage type and called the Globe



From the Four Winds



TALK of Road Race Over Andes—According to advices received by the J. I. Case Threshing Machine Co. from its Argentine representative, there is talk of running a road race from Buenos Aires to Valparaiso across the Andes mountains. Such a contest probably would serve as a supreme test for both driver and car.

New Motor Line in Texas—A new motor car line has been established in Texas between Mason and Brady, where railroad connection is obtained. Passengers are now being handled and a freight truck service will be inaugurated shortly. The residents of the section are agitating the construction of a first-class motor road from Mason to Brady, to be constructed by Mason and McCulloch counties.

Milwaukee Motorists "Very, Very Good"—For the first time since speed limits were placed on motor vehicles by city and state, Milwaukee motorists were given a clean bill of health for the month of February, 1914. Not one arrest for speed violations was made during the month, while in February a year ago the number of arrests was ten. While motorists point with pride to this record, some unkind citizens maintain the good report is due to the fact that nearly all of Milwaukee's winter of 1913-1914 was confined to the month of February.

Mexico Has Time to Build Roads—The Mexican federal government has placed the construction, inspection and supervision of the roads and bridges of Mexico under a separate bureau in the department of public works and communications, and has placed Eduardo Ortiz at the head of the new bureau. Three important highways are now being constructed in Mexico, as follows: between the City of Mexico, Puebla and Vera Cruz; City of Mexico and Morelia; and City of Mexico and Pachuca. The department is now preparing estimates for the construction of main roads between Morelia, Guadalajara and Tepic; City of Mexico to the northern border; and from Pachuca to Tuxpan.

Gives County Oiling Truck—The Automobile Club of St. Louis this spring will spend \$10,000 in maintaining and building new roads in and around St. Louis. The first move of the executive committee, which will have charge of the appropriation, was to order a 5-ton Garford truck carrying a 1,000-gallon oil tank, which will be presented to St. Louis county officials to be used in oiling the country roads. The oiling truck is equipped with a compressed air sprayer so the oil will be forced into the road, thus eliminating great pools of oil settling in spots as was the case when the oil was distributed from a regular sprinkling cart with no pressure on the valves.

To Dedicate Motoring Bridge—April 11, the day before Easter, has been designated as the date for the dedication and formal opening of the \$250,000 motoring bridge across Egg Harbor Bay that will form the connecting link for motorists between Cape May and Atlantic counties. It is planned to make the occasion an eventful one. Representatives of numerous organizations in Ocean City, Somers Point and other seashore resorts, officers of the Ocean City Automobile Bridge Co. and many motorists from Philadelphia planning to spend Easter day in Atlantic City, will participate in the exercises, which will include, among other things, a motor car parade from Ocean City to Atlantic City and return over the bridge. President Wilson will be invited to be the guest

of honor. Invitations also will be extended to Governor Fielder of New Jersey and to United States Senators Martine and Hughes.

To Mark Wyoming Motor Roads—A campaign to mark the motor roads throughout Wyoming with signboards will be started at once by the Sheridan Motor Club. This was announced a few days ago by Dr. F. M. Stahl, a member of the Sheridan club, who called upon Denver good roads promoters on his way home from a tour to the Pacific coast. Dr. Stahl said he and other Sheridan motorists were greatly impressed by the signboards put up in Colorado by the Denver Motor Club and in California by the Auto Club of Southern California, and that they intend to bring the matter before all the motor clubs and good roads organizations in Wyoming, and also call upon the county commissioners and

the Wyoming state highway commission for help. He predicts a great increase in touring through the Rockies during the next 2 years.

Harrisburg Show Opens Saturday—The fifth annual show of the Harrisburg Motor Club will be held at the Rex garage, Harrisburg, Pa., starting Saturday and continuing for a week. The total 13,000 square feet of floor space has already been taken by the exhibitors and from the interest aroused the show will be larger than ever. The display will include a varied line of motor cars and all kinds of accessories.

Gas Price Lower in Milwaukee—Milwaukee oil companies have issued a new price schedule for tank wagon deliveries of gasoline, effective March 5, which shows a reduction of 1/2 cent in the price of 65 test gas. Other grades remain the same as for the past month, when a half cent reduction in all grades was announced. A year ago, 65 test sold at 18 1/2 cents per gallon in Milwaukee. The present quotation is 15 1/2 cents.

Plan Tent Show This Fall—An elaborate program for this year is being considered by the Indianapolis Automobile Trade Association, which has just concluded its annual spring opening. The association plans to give a fall show in tents at the Indiana state fair grounds. Other things being considered include trade extension trips through the south and southwest for Indiana manufacturers and through Indiana for Indianapolis dealers. Another thing being considered is a midsummer parade and floral pageant. The various suggestions will be acted upon soon.

New York Dealers Elect Officers—The newly elected board of directors of the Automobile Dealers' Association of New York met March 3 for the purpose of electing officers. R. H. Johnson, of the White Co., was unanimously elected president, Charles H. Larson, of the Oldsmobile company, was re-elected vice-president and Frank Eveland, of A. C. Spaulding & Bros., was re-elected secretary and treasurer. Charles A. Stewart continues as general manager. The large number of bills pending before the state legislature were brought up for discussion as well as the number of city ordinances pending before the board of aldermen. It was decided to appoint a special committee to take charge of each of these subjects.

Colorado Plans Good Roads Campaign—The 1914 good roads campaign of the Denver Motor Club has been started by engaging D. Ward King, of Missouri, known as the "father of the road drag," for a series of five lectures and demonstrations in Denver and the four adjoining counties of Adams, Arapahoe, Douglas and Jefferson. The meetings will begin March 30 and each one will include a practical demonstration of actual road work done with a split-log drag constructed according to King's specifications. These four counties, the state highway commission and the Colorado Good Roads Association will co-operate with the motor club in this campaign, which is counted upon to mark the beginning of a great movement for improving Colorado roads. This systematic dragging by the King method, which has made famous the roads of Iowa and is accomplishing excellent results in other states at small expense, is believed to be especially suited to the roads in this part of Colorado. The fact that this method has the indorsement of the United States government helps to increase the enthusiasm of the good roads workers arranging this King campaign. It is also reported that Boulder, Fort Collins, Greeley, Fort Morgan and perhaps other

Coming Motor Events

SHOWS, CONVENTIONS, ETC.

March 7-14—Boston passenger car show.
March 12-14—Show, Hilldale, Mich.
March 9-14—Cedar Rapids, Ia.
March 16-21—Cedar Rapids, Ia.
March 17-21—Boston truck show.
March 21-28—Maritime show, St. Johns, N. B.
March 26-31—Show, Racine, Wis.
March 30-April 4—Denver show.
April 12—Show, Palermo, Sicily.
April 12-19—Austrian show.
April 14-18—Deadwood, S. D., show.
September 26-October 6—Berlin show.
October 16-26—Paris show.
November 6—Olympia show.

CONTESTS

March 1-25—Tour of France.
March 2-20—Army four-wheel drive tractor endurance tests, France.
April 19-29—Coupe de Tourisme, 1,000-mile cyclecar and light car endurance test around France.
April 22—Track meet, Bakersfield, Cal.
May 25-26—Targa Florio race, Sicily.
*May 30—Indianapolis 500-mile race.
May 30—New York track meet.
May 30—Track meet, Providence, R. I.
June 1—Florio cup race, Island of Sicily.
June 6-7—Track meet, St. Louis, Mo.
June 10-11—Isle of Man road races, Great Britain.
June 17-18—Hill climb, Uniontown, Pa.
June 30—Track meet, Sioux City, Ia.
July 3-4—Road races, Tacoma, Wash.
July 4—French grand prix, Lyons.
*July 4—Three hundred mile race, Sioux City, Ia., speedway.
July 4—Track meet, Providence, R. I.
July 17-18—Speedway races, Seattle, Wash.
July 25-26—Belgium grand prix road races.
August 15—Le Mans cyclecar grand prix race.
July and August—French army truck subsidiary trials.
August 2-9—Six day cyclecar reliability in French Alps.
August 16—Coupe Internationale; light car race, Le Mans.
August 17—Grand Prix of France, Le Mans.
August 28-29—Road races, Elgin, Ill.
September 5—Track meet, Milwaukee, Wis.
September 6-7—Italian grand prix.
September 7—Track meet, Providence, R. I.
September 9—Speedway races, Pomona, Cal.
September 9—Road race, Corona Beach, Cal.
October—Kerosene motor tests, Paris.
October—Gallion hill climb, Paris.
October 2-3—Track meet, Oklahoma City, Okla.
October 2-3—Track meet, Trenton, N. J.
November 8-11—Track meet, Shreveport, La.
November—El Paso-Phoenix road race.

* Sanctioned by A. A. A.

points will avail themselves of King's services independently of the campaign being arranged for Denver and vicinity.

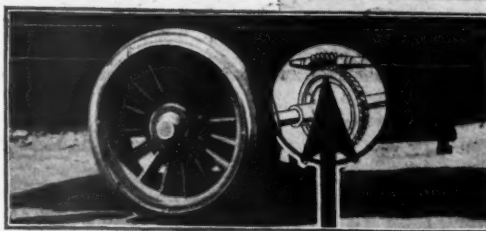
Vote Bonds for Road Building—Good roads advocates won a decided victory in Springfield township, Allen county, Ind., when at a popular election it was voted to bond the township for the construction of 14 miles of stone roads. Opposition to the proposition was almost a negligible quantity, the vote showing 212 in favor of the roads and but 29 opposed. Five roads are included in the description and the work when completed will give Springfield township one of the best improved road systems in Allen county.

Pecos Valley Motorists Organize—The Pecos Valley Automobile Association has been organized at Pecos, Tex., with an initial membership of thirty-five. It is expected to increase the roll to 100 members within a few weeks. The officers are: Dr. W. H. Moore, president; E. D. Balcom, vice-president; H. B. Link, secretary, and H. C. Cooke, treasurer. The new association will lend its support to the proposed motor highway along the Texas & Pacific railroad from Fort Worth to El Paso.

Will Promote Cyclecar Races—Cyclecar racing will be developed this season by the Milwaukee motordrome, constructed early in 1913 by the Milwaukee Motordrome Co. at a cost of \$75,000, and since then used exclusively for motorcycle events. At the annual meeting of stockholders it was determined to take up and initiate the newer sport of matching cyclecars in speed events. Joseph W. Munch was elected manager to succeed Robert Tomsen, promoter of the drome and active head during the first season. The first events are planned for May 30.

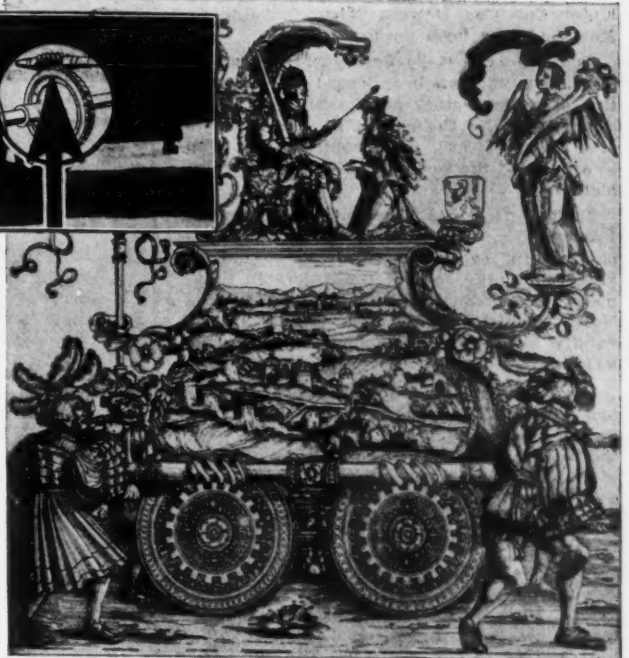
Ohio Chauffeurs Must Pass Exams.—Secretary of State Graves has named Horace G. Williamson of Cincinnati to be Ohio state examiner of chauffeurs in the southern Ohio district. J. A. Lagour of Cleveland has been appointed in the northern Ohio district. Other examiners will be named later. The examination will consist of a common sense quiz as to the knowledge of the application of the state motor law and the traffic ordinances of the localities as well as the chauffeur's ability to handle the car. No technical examination will be required. The exami-

Worm-Drive Vehicles of 1500 and Today



THAT principle of propulsion known as the worm gear, although perfected and adopted by motor car manufacturers in the twentieth century, is not a new idea, as a glance at the larger illustration, showing a triumphal chariot designed for the Emperor Maximilian some 400 years ago, will prove. Moreover, the worm gear is older than the sixteenth century. Archimedes, the Attic mathematician, was the first to study the peculiar properties of the spiral back in 250 B. C.

and applied his knowledge in a practical manner to the raising of water and also to the rotation of the doors of the ancient Greek temples. The American Indian also knew something of the use of the worm gear, as is attested by a crude relic found in Mary Jemison's cottage on the Letchworth park estate, New York. This is a simple machine for some weaving process in which a right-angled change of motion is obtained with a worm gear cleverly cut out of wood. The worm gear drive was tentatively tried on steam traction engines about 1850 but was never very seriously adopted until 1893, when F. W. Lanchester used it on his motor cars. The worm gear, ancient and modern, is shown in the illustrations. The larger is that of Maximilian's chariot, reproduced from a wood cut, and the smaller is a view of the drive of a Pierce-Arrow truck.



nation is something new in Ohio and was made necessary by the recent state law.

Buick Team Wins Membership Race—The Hoosier Motor Club of Indianapolis on March 1 concluded its membership campaign, which resulted in securing 164 new members and bringing the total membership to 500. The

campaign was called a "500-mile membership race," and a reproduction of the Indianapolis speedway was used to record the progress of the various membership teams. Each team was given the name of a motor car. The Buick team won, with the Lyons-Knight second and the Premier third.

Recent Incorporations

Albany, N. Y.—Cosmopolitan Automobile School Co., capital stock, \$5,000; incorporators, A. G. Armento, R. J. Morris, B. Wertheim.

Albany, N. Y.—Panama Tire & Rubber Co., capital stock, \$15,000; incorporators, A. E. Schwartz, G. L. Lewis, S. V. Morris.

Biddeford, Me.—Rylander Mfg. Co., capital stock, \$400,000; to deal in motor vehicles; incorporators, J. A. Snow, F. B. Ross.

Boston, Mass.—Conway Machine & Garage Co., capital stock, \$3,000; incorporators, A. E. Stoddard, A. C. Lary, H. H. Sylvester.

Buffalo, N. Y.—Velodrome Co., capital stock, \$30,000; to promote motor races; incorporators, Wm. M. Wilson, Dai H. Lewis, F. Vokes.

Chicago—Merchants Motor Truck Mfg. Co., capital stock, \$100,000; to manufacture and deal in motor trucks; incorporators, W. Schulze, J. W. Misch, C. A. Martin.

Cincinnati, O.—Court Street Garage & Automobile Co., capital stock, \$20,000; general garage business; incorporators, M. A. Bear, E. A. Hauck, J. H. Ahlebrandt, Jr., F. E. Burnett, A. C. Caldwell.

Cleveland, O.—Waite Auto Livery & Garage Co., capital stock, \$10,000; to operate garage; incorporators, A. F. Waite, J. B. Oviatt, C. E. Hubbell, C. R. Brown, A. E. Rogers.

Cleveland, O.—Auto Repair, Storage & Supply Co., capital stock, \$5,000; general garage business; incorporators, T. A. Cretney, N. H. Reed, C. T. Kirkbride, F. A. Irvine, J. R. Collister.

Cleveland, O.—Corcoran-Seldel Co., capital stock, \$25,000; to manufacture and deal in motor car parts; incorporators, G. S. Case, F. W. Treadway, W. H. Mariatt, F. B. Bolton, R. G. Morrison.

Cleveland, O.—Knight Engine Co., capital stock, \$10,000; to build internal combustion engines; incorporators, B. A. Gage, C. S. Wachner, H. H. Burton, R. E. Bixby, A. D. Howe.

Columbus, O.—Hilane Garage & Machine Co., capital stock, \$10,000; general garage business; incorporators, C. Shockey, C. S. Williams, J. C. Langley, F. T. Price, C. M. Carmichael.

Dallas, Tex.—Automobile Tire Co., of New York, capital stock, \$10,000.

East Orange, N. J.—Frank Vam Syckel Garage Co., capital stock, \$250,000; incorporators, H. W. Picking, C. O. Gyer, F. E. Rugeles.

Freeport, N. Y.—Long Island Tire Co., capital stock, \$1,500; to deal in tires; incorporators, M. P. Denton, J. S. Denton, H. E. Wetzig.

Green Island, N. Y.—Van Curve Light Co., capital stock, \$10,000; incorporators, W. H. Rabbett, T. E. Vanderwerken, R. Caldwell, R. T. Fleming.

Lockport, N. Y.—Lockport Auto Supply Co., capital stock, \$5,000; incorporators, A. L. Noag, J. R. Jelley, E. H. Huber.

Milwaukee, Wis.—H. L. Hadden Co., capital stock, \$15,000; to deal in motor car accessories; incorporators, E. G. Hadden, N. M. Kent, E. J. Kappelman, H. L. Hadden.

Milwaukee, Wis.—Milwaukee Cyclecar Co., capital stock, \$75,000; to manufacture cyclecars; incorporators, C. J. Elgel, S. Elgel, S. P. Carroll.

Milwaukee, Wis.—Wisconsin Cyclecar Co., capital stock, \$25,000; to deal in cyclecars; incorporators, W. B. Christie, W. H. Schwab, W. Fernekes.

New York—Lincoln Tire & Rubber Co., capital stock, \$5,000; incorporators, O. K. Pacht, D. Gross, J. Cohen.

New York—S-P Vaporizer Co., capital stock, \$10,000; to manufacture and deal in accessories; incorporators, J. Von Waldy, S. Y. Beach, R. Stevens.

New York—Hartford Tire Co., capital stock, \$10,000; to manufacture and deal in rubber tires; incorporators, E. J. Forhan, F. B. Knowlton, S. V. Dowling.

New York—Indestructible Tire Corp., capital stock, \$200,000; to deal in motor car tires; incorporators, A. L. Potter, J. A. Inslee, A. P. Anderson.

New York—Royal Welding & Radiator Co., capital stock, \$2,000; motor car repairs; incorporators, L. H. Moos, I. H. Lambert, B. Feldman.

Rochester, N. Y.—Barclay-Rice Co., capital stock, \$25,000; motor car accessories; incorporators, E. L. Barclay, J. G. Barclay, J. E. Rice.

Rochester, N. Y.—Wagner-Dolph Co., capital stock, \$25,000; motor car business.

Brooklyn, N. Y.—Oil Engine Corp. of America, capital stock, 10,000; incorporators, I. Buxbaum, N. Sitren, B. Wechsler.

Schuylerville, N. Y.—Ford Garage Co., capital stock, \$3,500; incorporators, P. C. Ford, H. A. McRae, P. Kahn.

Syracuse, N. Y.—Fuller-Ashley Co., capital stock, \$1,500; incorporators, E. F. Fuller, W. A. Ashley, A. J. Sweeney.

Toledo, O.—American Juvenile Auto Co., capital stock, \$10,000; to manufacture and deal in children's motor cars; incorporators, C. Murphy, W. C. Binns, A. C. Lucken, L. M. Smith, J. H. Frick.

Trenton, N. J.—Flisk & Dunham Rubber Co., capital stock, \$50,000; incorporators, C. F. Flisk, R. C. Dunham, A. A. Taylor.

Vancouver, B. C.—British Columbia Tire & Rubber Co., capital stock, \$10,000.

Welland, Ont.—Ontario Tire & Rubber Co., capital stock, \$750,000; to manufacture tires; incorporators, T. J. Costello, R. Cooper, J. R. McCollum, G. C. Brown, B. J. McCormick.

Winnipeg, Man.—Firestone Tire & Rubber Co., capital stock, \$5,000; incorporators, A. O. Myers, J. H. M. Kennedy, E. H. Matheson, P. C. Locke, F. R. Sproule.

Youngstown, O.—Consumers' Auto Supply Co., capital stock, \$20,000; to conduct garage; incorporators, C. N. Jackson, M. H. Reese, C. L. Baldwin, A. V. Hinman, E. E. Robinson.

Youngstown, O.—Electric Auto Service Co., capital stock, \$5,000; to deal in motor cars; incorporators, A. F. Claus, D. W. Numan, M. M. Conroy, J. V. Murphy, P. J. Janes.

Packard Declares Quarterly Dividend—

The regular quarterly dividend of 1% per cent upon the preferred stock of the Packard Motor Car Co., Detroit, Mich., payable on March 14, has been declared.

Addition to Kelly-Springfield Plant—A building permit has been issued for the erection of a three-story addition to the Kelly-Springfield Tire Co.'s plant at Akron, O., to cost about \$20,000. The contract has been awarded and the work will be rushed to completion.

Capital Stock Is Doubled—The Vulcan Process Co., Minneapolis, Minn., has increased its capital stock from \$50,000 to \$100,000 to take care of its growth in business. The company is sales agent for the Northern Welding and Mfg. Co., 2429 University avenue, which makes oxo-acetylene welding outfits for motor car parts.

Buys Gallon Truck Company—W. J. Geer has purchased the assets of the Cleveland-Gallon Motor Truck Co. of Gallon, O., from the receiver. Mr. Geer represents a number of Gallon citizens who purchased the property to organize a local company to operate the plant. The company went through a receivership because of lack of capital.

Johns-Manville Branches Move—The necessity for larger space and better facilities to handle their increased business compelled the Indianapolis, Ind., and Louisville, Ky., branches of the H. W. Johns-Manville Co. to seek larger quarters. The new address of the Indianapolis branch is 408-410 North Capitol avenue; that of the Louisville branch, 659-661 South Fourth avenue.

Stockholders Confirm Sale—The stockholders of the Reeves Engineering Co. of Mount Vernon, O., at a recent meeting confirmed the action of the board of directors in selling the property to the Hope Forge and Machine Co., a new corporation, which will manufacture gas engines in addition to other machinery. W. H. Hammon is president of the new concern.

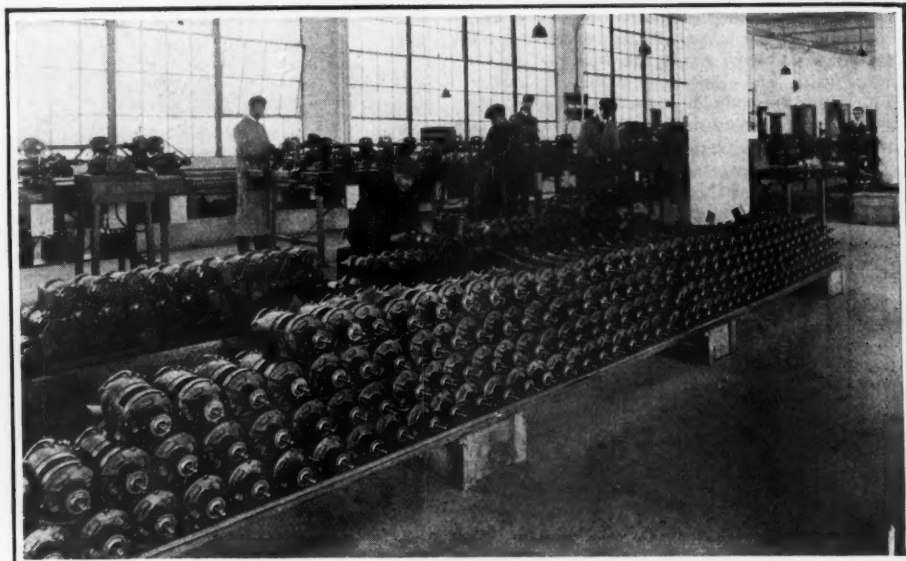
To Manufacture Truck Parts—Lima, O., will soon have a manufacturing plant for the making of tanks, under-pans, fenders, metal mudguards, light radiators and the like to supply motor trucks in the vicinity. Virgil M. Kline, who has just resigned as purchasing agent for the Gramm-Bernstein company, will be the new manager.

Fire Damages Petrolea Plant—The Petrolea Motor Car Co. of Petrolea, Ont., was damaged recently by fire to the extent of \$20,000, of which there was insurance of \$12,000. Seven complete cars which were to be shipped in the near future were burned. William English, owner of the motor company, is undecided as to whether or not the plant will be reconstructed.

Seeking Site for Tire Factory—The Midgley Tire and Rubber Co., organized by Thomas H. Midgley of Columbus, is negotiating with the chamber of commerce of Lancaster, O., with a view of locating the proposed tire factory in that city. Henry Davis is president of the company. He has asked the citizens of Lancaster to subscribe to \$200,000 of the stock of the company in consideration to locating the factory in that city.

Palmer-Singer Receiver Named—John J. Kuhn has been appointed receiver for the Palmer-Singer Mfg. Co. of Long Island City and given full power to conduct the business. The claims against the company are as follows: Gilliland, \$5,000, on note given for money loaned; Charles Singer, \$645, on demand note, and \$11.99 on open account; Caroline Singer, \$5,825, on demand note, and \$10 on open account. In addition, the petitioners claim that they have provable claims against the corporation for \$60,000, which have not yet matured. They allege that the company's present condition is as follows: In-

Among the Makers



DYNAMOS READY FOR ASSEMBLING IN GRAY & DAVIS FACTORY

Gray & Davis' New Starting and Lighting

GRAY & DAVIS have recently taken possession of their new starting-lighting system factory at Boston. It occupies the center of a spacious plot facing the Charles river. Five stories in height, with a large amount of window area, the exterior offers a most pleasing impression through the use of tapestry brick. The material used in construction is reinforced concrete. The main building measures 381 feet 6 inches in length, with a floor space of nearly 140,000 square feet, or approximately 3 acres. There is an ell in the rear, 36 by 62 feet. This runs through the full height of the building and contains elevator tower, stair tower, tool, store, locker, and wash rooms. For the last three uses, mezzanine floors are interposed above the first floor. This portion of the structure is framed in steel.

The one-story portion at the rear is used in the western end as a receiving room. The eastern end of this story is the garage and service shop. In the central portion, under the ell or rear tower, is the shipping room in direct connection with the railroad by means of the customary platforms. Skylights, over almost the entire area of the one-story portion, give ample light for all purposes. The building has no basement. The main floor was laid directly upon the fill without the use of forms. It is thus practically a part of the earth. Piers were carried down to a solid footing at a depth of 12 feet.

All floors above the first are 8½ inches thick, these slabs measuring 20 feet square to center of columns and being built without beams or girders of any kind. The top layer is about 1 inch of granolithic finish which was laid some time after the structure of the floor. The large open space between supports, provided by the wide spacing of the columns, makes it possible to locate machinery almost without regard to interference from this source.

Between wall columns a reinforced concrete beam, 36 by 8 inches, was cast in each bay. This is cast into slots left in the pilasters, thus making an expansion joint at each end of the beam. These beams form a portion of the outside wall of the building. As the lower edge of the beam is in the same plane as the ceiling, it will be noted that this beam extends well above the floor level and that the floor is dependent from it. By this means the windows are run clear up to the ceiling level and an absolute maximum of light is obtained. The window area is 70 per cent of the entire wall area.

Steel sash is used throughout, in each case being so arranged that 33 per cent of the window area is adjustable for ventilation, etc. In the case of the executive office, on the second floor, the operating portion of the sash is double hung so that it may be handled as ordinary windows. In the manufacturing part of the building each ventilator sash is pivoted at the center. The area available for ventilation thus figures out at 21 per cent

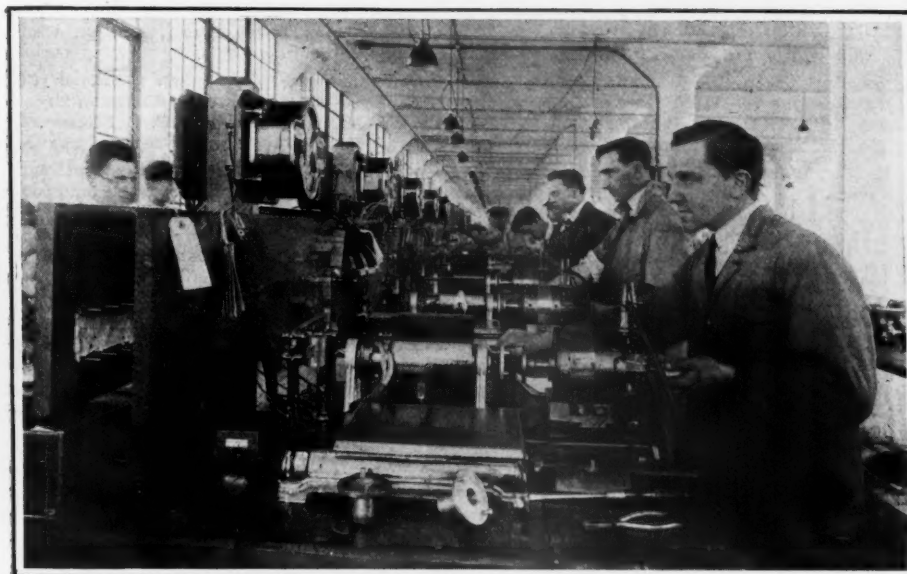
ventory, \$250,000; plant equipment, \$132,000; money in hand, \$5,000; deposits with manufacturers, \$8,000. Total, \$395,000. It is stated that the action came about through a want of working capital and not from inability to market the Palmer-Singer car.

Trunk Operators Graduate—The first term of the Overland-Garford school for truck engineers, Cleveland, O., has just been completed and the graduates are as follows: William Du Bois, W. T. Davies, T. S. Houston, John Becker, A. Bradbury, G. Stice, Albert May, W. R. Cubbon, G. Knudmiller, H. W. Sears, Louis Weinner, F. S. Tebbs, A. Lezius, R. E. Nesbitt, Roy Hull, H. H.

Meginess. This class was made up of truck drivers, truck owners and representatives of companies operating trucks who realize that the future of motor trucks is largely in the hands of the men who operate them. The course of instruction covers shop work, class instruction and lectures by outside engineers.

Two-Thirds of Buick Output Sold—Two-thirds of the Buick Motor Co.'s output of 32,000 cars have been sold and delivered, according to a statement issued by R. H. Collins, general sales manager. Deliveries for October exceeded any like period in the history of the company, and while November ordinarily marks the beginning of the in-

and Dealers



GIVING GRAY & DAVIS MOTORS FINAL TEST

System Plant at Boston a Model of Its Kind

of the entire wall area of the building. Natural ventilation alone is provided, no blower system being needed.

The system of heating has been worked out very ingeniously, this being one of only three buildings in the United States in which the peculiar combination to be described has been installed. The unusual window area made it necessary to use a large amount of radiation surface for heating. To have provided this in the form of coils and radiators along the walls would have involved a great many large units. It was decided, therefore, to use the sprinkler piping in the ceiling as an auxiliary heating surface. This, of course, necessitated the use of hot water as a heating medium, with its ready control and adaptability to changing climatic conditions.

The offices are handsomely finished. The partitions are solid mahogany and glass, reaching a height of about 8 feet above the floor. The windows in this section have double hung sash in place of the pivoted sash in the manufacturing end. The radiators are of a very pleasing pattern, taking the place of the coils of piping in the factory. The furniture, especially manufactured, matches the partitions and decorations. Mr. Gray's office and the directors' room adjoining, have large open fire places. The floors are laid in red tile and covered by rugs. The windows are screened by silk velour curtains and all of the appointments are in keeping.

The lobby on the first floor opens directly upon a broad staircase with easy flight, which lands near the center of the offices, and permits ready access to all parts. On the first floor is also the retail sales department. Back of the private offices and separated from the main corridor by a wrought iron rail, the general offices, occupied by clerks and stenographers, covers the whole width of the building. The broad corridor, running down the center from the head of the staircase to the door leading into the manufacturing department, and limited by the glass and mahogany partitions of the private offices, passes on through the general office without partitions on either side, the location of desks serving as a general outline to its course.

At the four corners of the main building wrought iron balconies have been added on the second floor as ornamentation. Painted a bronze green, they add a touch of color which blends well with the gray of the concrete and the mottled red and purple of the tapestry brick. The marquee has the same color scheme as the balconies and adds a further touch of ornateness to the east end of the structure. About 600 men are constantly employed in the factory, and the output averages 320 complete systems each working day.

active season in motor cars, November deliveries exceeded October. December lacked only a few sales of reaching the November volume, and January deliveries exceeded the average for October, November and December more than 33½ per cent. Cash deliveries for the last week in February totaled 1,226 cars.

Twyman to Look After Agencies—While B. W. Twyman, head of the Twyman Motor Car Co. of Columbus, which has branches in Cincinnati and Dayton, will devote a greater part of his time to his duties as general manager of the Interstate Motor Co. of Muncie, Ind., he will not give up his Ohio interests. George E. Vogel song, who has

been assistant to Mr. Twyman for 5 years, will be general manager of the Twyman company. E. A. Neff, the assistant general manager, will be in charge of the Columbus retail store.

Will Establish Honolulu Agency—C. F. Redden, general sales manager of the Maxwell Motor Co., has just left Detroit on a 10,000-mile swing through middle-western and Pacific coast territory. Before returning from the coast, he will make a side trip to the Hawaiian Islands for the purpose of establishing a Maxwell agency in Honolulu. Foreign representations has thus far been secured in practically all important trade centers of Europe and Asia, and in addition,

agencies have been established in Cairo, Egypt; Capetown, South Africa; and several points in South America and the West Indies.

Vacuum Oil Co. Extends Charter—At the annual meeting of the Vacuum Oil Co., Rochester, N. Y., the directors were re-elected. The charter of the company was extended 50 years.

New Welding Plant for Elmira—Maurice A. VanBrunt has filed a certificate of incorporation in Elmira, N. Y., having organized the Elmira Welding and Machine Co. there at 312 State street.

Made Swinehart Branch Manager—Stanley F. Hall has been appointed manager of the Boston branch of the Swinehart Tire Co. He was formerly with the Kelley-Springfield Truck Co. in Boston.

Franklin Opens Print Shop—The Franklin Automobile Co., Syracuse, N. Y., has opened a print shop as a distinct department. A new catalog is the first publication gotten out by the Franklin printers.

Leaves Boston Goodrich Branch—Howard B. Limric, manager of the New England branch of the Goodrich Tire and Rubber Co. for several years, resigned recently. He has been succeeded by William H. Moore, his assistant.

Cyclecar Company Elects Officers—At the first formal stockholders' meeting of the Mercury Cyclecar Co., Detroit, Mich., W. J. Marshall was elected president; H. A. Burnett, vice-president, and R. C. Albertus, secretary and treasurer.

Form Tire Filler Company—Charles C. Baker and Edward Philpott, both of Niagara Falls, N. Y., filed Saturday with the county clerk there a certificate of incorporation, the new firm being the Scientific Tire Filler Co. This concern will engage in making filler for motor car tires.

Gear Maker Enlarging Plant—The New Process Gear Corp., Syracuse, N. Y., is erecting a new three-story 40 by 100-foot concrete and steel building to provide additional machinery facilities for spur and bevel gear work. This new building is to be absolutely fireproof, with brick curtain walls and concrete floors, and will contain entirely new equipment.

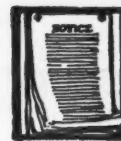
Elected Commercial Club President—George E. Seidel, of Richmond, Ind., president of the Pilot Motor Car Co. and the Seidel Buggy Co., last week was elected to the presidency of the Richmond Commercial Club. Mr. Seidel has been an active member of the commercial club for many years, serving several terms as director, and was elected without opposition. The club has nearly six hundred members and has exerted a powerful influence in industrial matters.

Changes in Bowser Staff—The S. F. Bowser & Co., of Fort Wayne, Ind., has created an executive board composed of the officers of the company with A. Z. Polhamus as chairman. This change was made in order to better handle the affairs of the company. S. B. Bechtel has been advanced to general manager to succeed Mr. Polhamus; W. G. Zahrt has been advanced to assistant general manager to succeed Mr. Bechtel; E. H. Briggs has been appointed general sales manager of the central district, succeeding Mr. Zahrt.

Ford Changes Pittsburgh Branch Plans—The Pittsburgh city council has passed an amended ordinance providing for an addition to the proposed Ford Motor Co.'s plant that is to be erected in that city. The plans for the addition provide for an extension of 25,000 square feet of floor space more than was shown in the original plans. Work on the building will be started March 15. The building will be eleven stories high and will cover an entire block. It will cost \$1,000,000 and will give employment to about 11,000 workmen.



Brief Business Announcements



HARTFORD, Conn.—The E. J. Todd Rubber Co. has taken the local agency for Prowodnik tires.

Seattle, Wash.—C. S. Mantel sales manager of the Harmon Motor Car Co., Reo and Lozier distributor, has resigned to engage in the motor car business at Wenatchee, Wash.

Seattle, Wash.—J. A. Leatherman, of the truck tire department of the Seattle branch of the Goodyear Tire and Rubber Co., has been promoted to the district staff in San Francisco, the change to take effect March 15.

Fort Wayne, Ind.—A. J. Roussey, who for several years was general agent for the Cadillac in the Fort Wayne territory, has taken up the sale of Federal tires and supplies and will act as distributor and do a wholesale and retail tire business in northern Indi-

ana and Ohio. The new concern will be known as the Roussey Auto Tire Co. C. J. Lomont will be associated with Mr. Roussey.

Bowling Green, O.—William Caldwell has purchased the Standard Garage in Bowling Green from J. D. McLaughlin. The garage is located on South Main street.

Seattle, Wash.—T. B. Waller, former Seattle distributor of the Lincoln truck and Imperial pleasure car, is now associated with the Lincoln Motor Truck Co., at Sacramento, Cal., in the capacity of assistant general manager.

St. Paul, Minn.—A. O. Ballard, formerly of the LaCrosse Auto Co., Minneapolis, has taken over the Selby Motor Sales Co., and will operate it as the Ballard Auto Co., 524 Selby avenue. The company has the agency for the Imperial, Herff-Brooks, Glide and the

Trumbull cyclecar in Ramsey, Washington and Dakota counties, Minn., and St. Croix and Pierce counties, Wis.

Boston, Mass.—The Spartan Rubber Co. has opened salesrooms at 715 Boylston street, Boston, Mass., in charge of F. C. Stetson.

Green Bay, Wis.—Louis G. Indra, who recently sold his interest in the West Side garage at Green Bay, Wis., has become secretary and general works manager for the H. J. Nelson Machine Co., now the Nelson-Indra Machine Co. of Green Bay.

Indianapolis, Ind.—The Indiana general agency for "inner tube armor" has been taken by W. I. Brown of Indianapolis, who will operate under the name of the Hoosier Inner Tube Armor Co., with headquarters at 429 North Capitol avenue in this city. Mr. Brown has disposed of his interests

Recent Agencies Appointed by Motor Car Manufacturers

PLEASURE CARS

Town	Agent	Make
Albany, Ga.	M. C. Hule	Chandler
Albany, N. Y.	C. S. Ransom	Chandler
Alpine, Texas	Cas Edwards	Chandler
Altos, Pa.	H. H. Edgely	Chandler
Augusta, Ga.	Speth Garage & Sales Co.	Chandler
Aberdeen, Wash.	Harry Kidd	Giant
Aberdeen, Wash.	W. S. Fitts	Grant
Astoria, Ore.	Nelson Auto Co.	Chandler
Akron, O.	Romig Auto Garage	Chandler
Allentown, Pa.	Universal Auto Co.	Chandler
Argenta, Ark.	Twin City Auto Co.	Chandler
Aurora, Ill.	Wolf-Parker Co.	Chandler
Baltimore, Md.	Poehlmann Auto Co.	Chandler
Beaumont, Texas	A. E. Brulin	Chandler
Butte, Mont.	C. V. Fulton	Chandler
Beloit, Kan.	Benjamin & Johnson	Chandler
Birmingham, N. Y.	Lowell & Hammond	Chandler
Bloomington, Ill.	Jacob Raxor	Chandler
Bridgeport, Conn.	Bulley's Auto Station	Chandler
Bridgeport, Ill.	W. B. Gray & Son	Chandler
Bristow, Ia.	C. E. Conger	Chandler
Brockton, Mass.	Chas. J. Olson	Chandler
Brooklyn, N. Y.	Tanner Motor Car Co.	Chandler
Buffalo, N. Y.	Ralph E. Brown Motor Car Co.	Chandler
Burlington, Ia.	American Motor Sales Co.	Chandler
Burlington, Vt.	Clifton C. Daigle	Chandler
Brookfield, Mo.	Barbee & Carter	Moon
Butte, Mont.	O. J. Thomas	Case
Hitchcock, Okla.	J. E. Grankhite	Maxwell
Baker, Ore.	Farnald & Crandall	Maxwell
Brooksville, Ky.	Dr. W. E. Corliss	Hupmobile
Bardonia, Ky.	Bardstown Garage	Hupmobile
Boston, Mass.	F. L. Roberts	Empire
Boston, Mass.	Charles Motor Car Co.	Briscoe
Boston, Mass.	Chandler Motor Car Co. of N. E.	Chandler
Bradford, Pa.	Standard Garage Co.	Chandler
Bartlesville, Okla.	Auto Repair Co.	Jeffery
Blair, Neb.	Jensen Brothers	Jeffery
Columbus, O.	Brasher Motor Car Co.	Westcott
Columbus, O.	Broad-Oak Automobile Co.	Saxon
Carthage, Tex.	O. E. Jones	Maxwell
Corydon, Ind.	V. H. Bullett & Sons	Maxwell
Carlsbad, N. M.	Chas. H. James	Chandler
Cedar Rapids, Ia.	W. H. Johnson	Chandler
Chicago, Ill.	Thos. J. Hay	Chandler
Cleveland, Ohio	Cuyahoga Sales Co.	Chandler
Columbia, S. C.	Robert Y. Kibler	Chandler
Cumberland, Md.	Automobile Repair Co.	Chandler
Calera, Okla.	J. C. Kenton	Jeffery
Canyon, Tex.	Grundy & Guthrie	Moon
Colorado Springs, Colo.	C. E. Wolf	Moon
Campit, La.	J. F. Smith	Jeffery
Calgary, Can.	H. H. Kerr & Co., Ltd.	Chandler
Cambridge, Ill.	C. L. Kettering	Chandler
Canton, O.	Canton Motor Car Co.	Chandler
Columbus, O.	Gaither Auto Co.	Chandler
Davenport, Ia.	Buck Motor Car Co.	Chandler
Denver, Colo.	Overland Auto Co.	Chandler
Detroit, Mich.	Grant Brothers	Chandler
Daytona, Fla.	T. F. Williams	Chandler
Denver, Colo.	Vreeland Brothers Auto Co.	Moon
Dayton, O.	Frank W. Blum Auto Co.	Moon
Des Moines, Ia.	Means Automobile Co.	Moon
Denver, Colo.	Colorado-Haynes Motor Co.	Haynes
Denver, Colo.	Charles F. Cole	Empire
Eagle Pass, Texas	Joseph DeBona	Chandler
Elkins, W. Va.	West Virginia Chandler Co.	Chandler
Eureka, Calif.	Johnson & Rusthol	Chandler
El Paso, Tex.	Elliott-Garret Co.	Packard
El Paso, Tex.	Elliott-Garret Co.	National
El Paso, Tex.	Elliott-Garret Co.	Oakland
El Paso, Tex.	Elliott-Garret Co.	Studebaker
Edmonton, Alta.	Holland W. Ross	Franklin
Fayetteville, W. Va.	J. C. Hamilton	Chandler

Town	Agent	Make
Forth Worth, Texas	Chandler Motor Car Co. of Texas	Chandler
Fenton, Mich.	E. F. Bullard	Jeffery
Fall River, Mass.	R. W. Tierney	Chandler
Freeport, Ill.	Cramer & Luecke	Chandler
Fresno, Calif.	Peacock & Robbins	Chandler
Fall Creek, Wis.	Stubbe & Stelter	Maxwell
Fall Creek, Wis.	Stubbe & Stelter	Ford
Fall Creek, Wis.	Stubbe & Stelter	Overland
Grand Rapids, Mich.	W. S. Farrant	Chandler
Griswold, Ia.	Grinnell & Son	Jeffery
Galesburg, Ill.	E. T. Radcliffe	Chandler
Gardner, Me.	Guy W. Lawrence	Chandler
Glens Falls, N. Y.	Empire Auto Co.	Chandler
Gloucester, Mass.	R. C. Wells	Chandler
Greensburg, Pa.	Westmoreland Motor Car Co.	Chandler
Green Castle, Pa.	Liniger Garage Co.	Chandler
Greenwood, Miss.	E. K. Myrick	Chandler
Greenwich, Conn.	A. W. Kemble	Chandler
Grundy Center, Ia.	Hawn & Frost	Chandler
Greenville, Ky.	J. P. Morgan	Hupmobile
Huntsville, Ala.	O. M. Graham	Moon
Houston, Texas	James C. Clinton	Chandler
Hinckley, Ill.	H. E. Peckman	Chandler
Honolulu, T. H.	Von Hamm-Young Co.	Chandler
Hudson, Ia.	Hudson Auto Co.	Chandler
Henderson, Ky.	W. H. Fitzhugh	Hupmobile
Harrodsburg, Ky.	Walter Martin	Hupmobile
Horse Cave, Ky.	Horse Cave Garage	Hupmobile
Hartford, Mich.	S. Doyle	Maxwell
Hartford, Conn.	G. I. Whitehead & Son	Ohio
Hartford, Conn.	Rettig Automobile Co.	Rayfield
Indiana, Pa.	Clymer Motor Car Co.	Chandler
Indianapolis, Ind.	Brant Bros.	Chandler
Independence, Ia.	Meyers Cowell Auto Co.	Chandler
Ithaca, N. Y.	C. J. Rumsey & Co.	Chandler
Imperial, Neb.	John N. Newman	Oakland
Indianapolis, Ind.	Bruce Osthimer	Universal
Joplin, Mo.	Davis Auto Co.	Chandler
Jersey City, N. J.	Burke Bros. Co.	Chandler
Junction City, Kas.	Wenger & Brockman	Packard
Hubbard, Ia.	Walter Kellar	Moon
Kountze, Tex.	W. S. Parker	Maxwell
Keokuk, Ia.	J. S. Bullock	Chandler
Kendalville, Ind.	H. C. Waterhouse	Moon
Kalamazoo, Mich.	Lewis A. Williams	Chandler
Kansas City, Mo.	White Motors Co.	Chandler
Lima, O.	H. L. Sherrick	Moon
Leland, Ill.	E. A. Danielson & Son	Chandler
Lowell, Mass.	J. Marin Auto Sales Co.	Chandler
Lyndonville, N. Y.	Lyndonville Ice & Cold Storage Co.	Chandler
Lynn, Mass.	Ernest Whitten	Chandler
Lexington, Ky.	Union Motor Car Co.	Packard
Lexington, Ky.	Union Motor Car Co.	Detroit
Los Angeles, Cal.	David & Merriman	Imp
Lima, O.	Lima Bulck Co.	Bulck
Lancaster, Ky.	J. C. Storms & Sons	Hupmobile
Lexington, Ky.	Kentucky Motor Sales Co.	Hupmobile
La Grange, Ky.	J. T. Yager	Hupmobile
Lawrence, Kas.	Lawrence Street Motor Co.	Packard
Marquette, Mich.	Asire & Palmer	Chandler
Milwaukee, Wis.	R. D. Rockstead	Chandler
Minneapolis, Minn.	Northwestern Auto Co.	Chandler
Montgomery, Ala.	Hobbs Motor Car Co.	Chandler
Montreal, Canada	Major Automobile, Ltd.	Chandler
Memphis, Mo.	Fravel & Hudson	Jeffery
Monroe, La.	W. F. Cummings	Jeffery
Mansfield, La.	Persinger & Williams	Jeffery
Malone, N. Y.	E. E. Hogel	Chandler
Manchester, Iowa	Arnold & Arnold	Chandler
Manchester, N. H.	Howard E. Johnson	Chandler
Marletta, Ohio	Jacob Spindler, Jr.	Chandler
Marshall, Texas	Henderson's Garage	Chandler
Morristown, N. J.	Wm. Stevenson Garage Co.	Chandler
Minneapolis, Minn.	Northwestern Automobile Co.	Saxon

in and has resigned as general manager of the Brown-Rowan-Buck Co., agent for the Studebaker in Indianapolis and vicinity.

Boston, Mass.—E. A. Hart has just been appointed manager of the New England branch of the Oldsmobile company with headquarters in Boston.

Phoenix, Ariz.—W. W. Catlin, formerly with the Phoenix Auto Co., has purchased the Southwestern Auto Co. from R. D. Roper. The Southwestern Auto Co. has the state agency for the Buick.

Seattle, Wash.—The name of the Olympic Motor Car Co., state distributor of the Chalmers and Saxon pleasure cars and Selden truck, has been changed to the H. L. Keats Auto Co. There is no change in the management or the personnel of the staff. The Keats company has moved its sales department and show room to the Harvard Investment building, 806 East Pike street.

Milwaukee, Wis.—The H. L. Hadden Co. of Milwaukee, state agent for Bethlehem spark plugs and numerous other specialties and accessories, has moved into larger quarters in the Manufacturers' Home building. The former quarters were at 22-24 Chamber of Commerce. The company has been incorporated with \$15,000 capital and the following officers elected: President, E. G. Had-

den; vice-president, E. J. Kappelman; secretary and treasurer, N. M. Kent; general manager, H. L. Hadden.

Brockton, Mass.—The Boulevard garage on Eastern avenue, Brockton, Mass., has just been sold to Albert J. Reeves of Somerset by Nelson Daudelin, who purchased it a short time ago from Wilfred N. Cote.

Butte, Mont.—The motor car sales firm of Howell & Riley has been dissolved, Herbert Riley announcing that he will give all his time to the garage, the Franklin and the Ford, while Howell will handle the Packard and Buick, and will be associated with M. E. Barry in this territory with the Cadillac.

El Paso, Tex.—George Elliott of Midland and Frank J. Garrett of El Paso have formed the Elliott-Garrett Co., and will engage in the motor car business here. The company will handle the Packard, National, Oakland and Studebaker, and also will deal in tires and other accessories.

Milwaukee, Wis.—The Wisconsin Cyclecar Co. of Milwaukee, which recently established a cyclecar agency and garage at 744-746 National avenue, has been incorporated with \$25,000 capital. The company will act as wholesale and retail distributor for Wisconsin of these lines: Trumbull, Zip, Dudley and LaVigne. Walter H. Schwab is president;

Walter Fernekes, vice-president, and W. Byron Christie, secretary and treasurer.

Los Angeles, Cal.—M. S. Bulkley & Co., coast distributor of Auto-car commercial cars, has commenced the manufacture of Bulkley-Rider tractors in Los Angeles.

Philadelphia, Pa.—The Gibbons-Wetherill Service Co., local agent of the Maxwell, 2126 Market street, has taken over the business of the Kisselkar Philadelphia branch. J. J. Kane, Jr., who formerly headed the Philadelphia branch, will continue as factory representative.

Indianapolis, Ind.—Frederick P. O'Brien, formerly with the J. W. Maguire Co., Pierce-Arrow agents in Boston, and later sales manager of the F. E. Wing Co., New England distributor of Marmon cars, resigned last week to go to Indianapolis, where he has taken the agency for the Pierce-Arrow car for the state of Indiana.

Boston, Mass.—Harrison Turner, who took the Moline-Knight for Boston during the New York show, has opened temporary quarters at 889 Boylston street in the former salesrooms of the Studebaker company and has placed Percy I. Reynolds, of Lynn, Mass., in charge of the sales. Later on permanent quarters will be opened in the new Barrison building on Commonwealth avenue.

Recent Agencies Appointed by Motor Car Manufacturers—Continued

PLEASURE CARS—Continued

Town	Agent	Make	Town	Agent	Make
Minneapolis, Minn.	Martin Motor Sales Co.	Wahl	Schenectady, N. Y.	B. A. Burtis	Chandler
Manhattan, Kas.	Whitelock Garage	Packard	Seattle, Wash.	Clark Motor Co.	Chandler
McPherson, Kas.	Talbot & Gilson	Packard	Sheridan, Wyo.	D. & D. Auto Co.	Chandler
Minneapolis, Kas.	Gage Auto Company	Packard	Somerville, N. J.	J. C. Henry	Chandler
Moberly, Mo.	E. E. White	Packard	South Bend, Ind.	Nat. L. Otis	Chandler
Minneapolis, Minn.	Minnesota Cyclecar Co.	Vixen	Springfield, Mass.	R. A. McKee	Chandler
Miami, Fla.	Jones Motor Car Co.	Chandler	Springfield, Mo.	J. E. Atkinson	Chandler
Nashville, Tenn.	Holland-Wood Motor Co.	Chandler	Springfield, O.	King Garage	Chandler
New York City	Brady-Murray Motors Corp.	Chandler	Stamford, Conn.	Wm. A. Clark	Chandler
Norfolk, Va.	H. H. Johnson	Chandler	Stapleton, N. Y.	E. Neumann & Sons	Chandler
Newark, N. J.	Whiting Motor Co.	Chandler	St. Petersburg, Russia	Michailovsky, Kock & Co.	Chandler
New Bedford, Mass.	W. L. Sturtevant	Chandler	Syracuse, N. Y.	W. R. Shaw	Chandler
New Haven, Conn.	Hoicomb Company	Chandler	St. Paul, Minn.	Martin Motor Car Co.	Cole
Newman, Calif.	W. G. Newsome	Chandler	St. Louis, Mo.	De Luxe Automobile Co.	Metz
New York City	Crossman & Sietcken	Chandler	St. Louis, Mo.	Lindell Sales Agency	Herff-Brooks
Nordin, Neb.	Langer & Frauen	Oakland	St. Louis, Mo.	Compton Heights Automobile Co.	Grant
New York	Partridge, Clark & Kerrigan	Premier	St. Louis, Mo.	Robinson & Newell Co.	Lexington
Newark, O.	Murray Connolly	Grant	St. Louis, Mo.	Robinson & Newell Co.	Howard
Omaha, Neb.	W. L. Huffman Auto Co.	Chandler	St. Joseph, Mo.	Selden-Maxwell Company	Packard
Okmulgee, Okla.	Smith & Lambert	Jeffery	Salina, Kas.	Ollinger Auto Company	Packard
Oakland, Calif.	S. G. Chapman	Chandler	Springfield, Mo.	Jess & Sturdy	Packard
Oswego, N. Y.	Steam Carriage Boiler Co.	Chandler	South Bethlehem, Pa.	L. L. Stern & Sons	Franklin
Ottawa, Ont.	J. P. Gilpin	Studebaker	Saginaw, Mich.	J. P. Beck	Chandler
Ottawa, Ont.	Ray Motor Car Co.	Oakland	St. Joseph, Mo.	E. D. Ead's Garage	Chandler
Ottawa, Ont.	Victoria Garage	Saxon	St. Louis, Mo.	Overland Auto Company	Chandler
Owensboro, Ky.	Harry Bortoff	Humobile	San Antonio, Tex.	Lozier Co. of San Antonio	Chandler
Philadelphia, Pa.	Chandler Motor Car Co. of Phil.	Chandler	San Francisco, Cal.	S. G. Chapman	Chandler
Pittsburgh, Pa.	C. B. McAllister	Chandler	Shreveport, La.	Henderson's Garage	Chandler
Portland, Ore.	Pacific Motors Co.	Chandler	Staunton, Va.	Jacob Baugher	Chandler
Plattsburg, N. Y.	Marshall, Wood & Riley	Chandler	Somerset, Pa.	West End Garage	Jeffery
Poughkeepsie, N. Y.	John Van Benschoten	Chandler	Stephenville, Tex.	Perry Hardware Co.	Maxwell
Provo, Utah	Berne Walton	Chandler	St. Paul, Minn.	Dayton Cyclecar Sales Co.	Dayton
Princeton, Ill.	J. M. Ennes	Moon	Syracuse, Neb.	James H. Eaton	Oakland
Pueblo, Colo.	Western Motor & Truck Co.	Moon	Tucson, Ariz.	J. F. Hankins	Chandler
Paducah, Ky.	Lack Auto Co.	Moon	Trinidad, Colo.	Mack Paterson	Chandler
Poughkeepsie, N. Y.	Ryder Motor Co.	Jeffery	Tarrytown, N. Y.	Koenig Bros.	Chandler
Pacific Grove, Calif.	Pacific Grove Garage	Chandler	Tulare, Calif.	R. D. Helm	Chandler
Parkersburg, Ia.	Enterprise Garage	Chandler	Tiffin, O.	C. L. Fifer	Chevrolet
Paterson, N. J.	Nathaniel Finch	Chandler	Tiffin, O.	G. W. Corthell	Paterson
Perthshire, Miss.	S. D. Knowlton	Chandler	Texarkana, Ark.	J. P. Cook	Maxwell
Petaluma, Calif.	J. H. Madison	Chandler	Tacoma, Wash.	Jesse Jones	Imp
Plymouth, Pa.	Chandler Motor Car Co.	Chandler	Tacoma, Wash.	Progressive Motor Co.	Buick
Port Henry, N. Y.	Tozer & Putman	Chandler	Uniontown, Pa.	Standard Automobile Garage	Chandler
Postville, Ia.	O. J. Blessin & Co.	Chandler	Uehling, Neb.	Larson Brothers	Jeffery
Pownall, Vt.	A. G. Parker & Son	Chandler	Utica, N. Y.	Skinnes Motor Car Co.	Chandler
Philadelphia, Pa.	Whiting Motor Co.	Chandler	Vancouver Island, B. C.	Thomas Plimely	Metz
Providence, R. I.	Elmwood Motor Car Co.	Chandler	Vancouver Island, B. C.	Jameson & Rolfe	Waverly
Philadelphia, Pa.	H. H. Bruah	Grant	Washington, D. C.	Chester H. Warrington	Chandler
Philadelphia, Pa.	Ralph H. Bobb	Broc	Washington, Pa.	C. B. McAllister Co.	Chandler
Philadelphia, Pa.	Ralph H. Bobb	Argo	Waverly, Ia.	V. A. Blum	Chandler
Philadelphia, Pa.	Eldredge Co.	Car-Nation	Westfield, N. Y.	H. L. Fink	Chandler
Parsons, Kas.	C. F. Ervin	Packard	West Union, Ia.	Knutson & Paulson	Chandler
Raleigh, N. C.	Raleigh Motor Car & Machine Co.	Chandler	White Plains, N. Y.	White Plains Garage Co.	Chandler
Richmond, Va.	B. A. Blenner	Chandler	Wilmington, Del.	Wilmington Automobile Co.	Chandler
Rochester, N. Y.	Strong-Crittenden Company	Chandler	Worcester, Mass.	Chandler Motor Car Co.	Chandler
Ruston, La.	C. P. Cooper	Jeffery	Waterloo, Ia.	Burd Auto Supply Co.	Moon
Red Bank, N. J.	Stryker & Stryker	Chandler	Waterloo, Ia.	Central Auto & Supply Co.	Chandler
Red Bluff, Calif.	H. H. Wiedieck	Chandler	Wingate, Ind.	C. H. Hunter	Chandler
Rochester, Pa.	Conrad Bros.	Chandler	Vancouver, B. C.	Hoffmeister Bros. Ltd.	Chandler
Ripley, O.	C. O. Sneider	Oakland	Winnipeg, Canada	Canadian Motor Co., Ltd.	Chandler
Richland Center, Wis.	Pier Auto Co.	Mitchell	Washington, D. C.	Warrington Motor Car Co.	Chandler
Richland Center, Wis.	Pier Auto Co.	Detroit	Youngstown, O.	Regal Sales Co.	Moon
Richland Center, Wis.	Pier Auto Co.	Ford	Youngstown, O.	J. Ralph Seldner	Chandler
San Jose, Calif.	Consolidated Garage	Chandler	York, Pa.	John Baer and Max Ludwig	Hudson

COMMERCIAL CARS

Aberdeen, Wash.	Harry Kidd	Gramm-Bernstein	St. Louis, Mo.	Lindell Sales Agency	Herff-Brooks
Columbus, O.	Minner-Main Garage	Vulcan	San Francisco, Cal.	H. A. Seller	Flint
Ellensburg, Wash.	E. L. Ferrier	Gramm	Tacoma, Wash.	Progressive Motor Co.	Republic
Salem, Ore.	W. S. Fitts	Gramm-Bernstein			

The Motor Car Repair Shop

OWNERS in general will not remove the magneto for the reason that it usually is difficult to replace it properly. However, the operation does not require any skill nor great knowledge of the engine. Let us take a four-cylinder motor, from which the magneto has been removed. The first step is to get the magneto ready. Remove the distributor cover and the breaker box cover, so that magneto appears as shown in Fig. 1. Place the breaker box in the retard position. If you do not know what position this is, imagine the magneto installed in the motor and then move the spark lever to the retard position, noting which way the breaker box lever moves. Usually the breaker box is shifted counter-clockwise for the retard. Grasp the end of the armature shaft, as shown, and turn the shaft around until the distributor arm is on segment No. 1. There is a mark either above the segment or near the wire leading from it. With the distributor arm still on No. 1 segment, turn the shaft backward and forward slightly, at the same time watching the breaker points. You will notice that at some time during the movement of the distributor arm across the segment the breaker points open. The object is to get the arm on the segment and the points just about to open. To do this move the shaft around until the points are wide open and then turn the shaft backward until the points just come together. When in this position, the slightest movement of the armature shaft in the proper direction will cause the points to separate. The magneto, if installed in the car in this position, would send a spark to No. 1 cylinder. The next step is to get No. 1 cylinder ready to receive the spark, and the work is completed.

If the motor happens to be a T-head motor with a petcock in the center, as shown in the illustration, the work is easy. Get No. 1 piston on top dead center and have both valves closed. This is the end of the compression stroke and the cylinder is ready to fire. If it is a T-head, as shown, place a piece of wire through the petcock and turn the motor over, and when the wire rises to its highest point the piston is on top dead center. But, you must keep turning if both valves are not closed. If the motor is an L-head, open the petcock and place your finger over it. Turn the motor over until you feel compression, let this escape gradually, turning the motor slowly. When the gas has ceased escaping, the piston is at or near top dead center. Another method is to watch the valves and flywheel. Usually a mark such as TC 1 & 4 appears on the flywheel, which means pistons 1 and 4 are on top dead center. This mark should line up with a mark on the cylinder casting; and when

Replacement of the Magneto

this is done, both intake and exhaust valve of that cylinder should be fully closed. You can tell if they are closed if you can rotate the tappets underneath the valve stems. With both valves closed and the piston on top dead center, slip the magneto

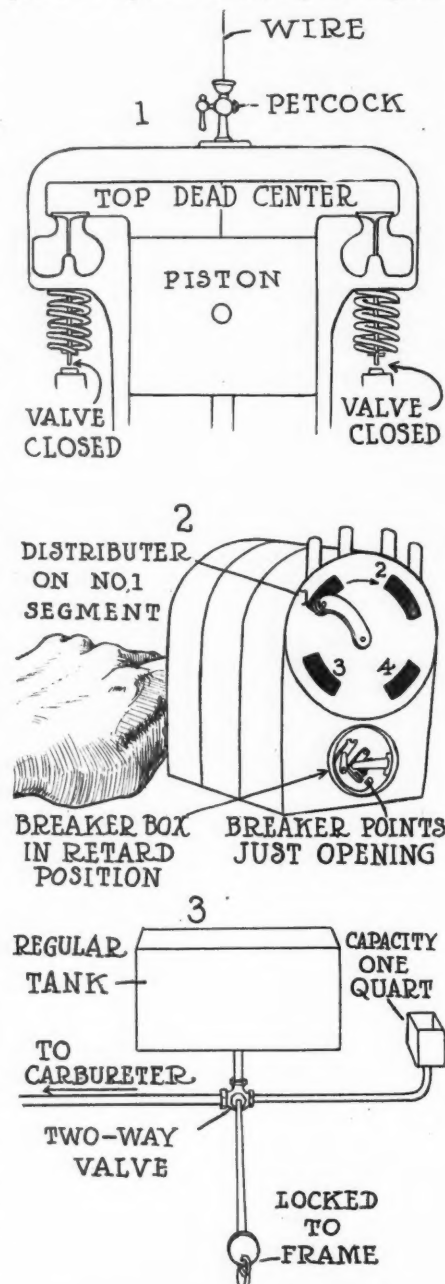


FIG. 1—HINTS FOR THE MOTORIST
1—Showing the position of the piston and valves when the magneto is ready to be placed in the motor. Both valves must be closed and the piston must be on top dead center
2—The magneto may be slipped in place when the breaker points are just about to open and the distributor arm is on No. 1 segment
3—An anti-joyride device consisting of an auxiliary fuel tank which holds about 1 quart. The two-way valve is operated by a rod extending through the frame

in place. If the coupling has to be turned around a little it does not matter.

A Joyride Preventive

Although the average garage is proof against the entrance of those seeking motor cars for the purpose of joyrides, many such persons often remove and destroy owners' cars. There are many forms of locks on the market which are invaluable and are in extensive use, but a simple form of "joyrideproof" device is shown in Fig. 1 at 3, which consists of an auxiliary fuel tank with a capacity of about 1 quart. A connection as shown and a two-way valve completes the apparatus. The 1-quart tank is filled each day, and when the owner is through with the car he turns the two-way valve so that only the 1-quart tank will feed to the carburetor. The 1-quart, more or less, is sufficient to take the car to and from the garage. Thus a person not knowing of the auxiliary tank could operate the car only for a short distance. The size of the small tank depends upon the distance from the garage to the owner's house, and in most cases 1 quart would be enough. Where cars are equipped with pressure gasoline feed it is necessary, in the installation of this system, to tap the air line to the main tank with a pipe extending to the small one.

Some Storage Battery Hints

In the Clearing House department in this issue is an inquiry from a reader concerning an overcharged battery and he asks for a remedy. A severely overcharged battery cannot be repaired. Not only is overcharging a battery, murder, but undercharging as well. In the former case the positive plates usually are injured and in the latter the negative. This only brings out the importance of using a meter to determine the condition of the accumulator and since batteries are expensive, comparatively, and electric meters low in price, it appears like willful neglect for an owner to leave his battery go unwatched.

When Parts Crack

When any metal part of a car cracks, the first thing to do is to prevent further cracking, rather than repair the injury. A crack may be prevented from extending by drilling one hole at each end. When inner tubes have blown out and the rubber cut considerably, it is a good idea to punch a hole at each end of the cut and then apply a patch.

Treating Brake Bands

A gunful of kerosene squirted upon rabestos brake bands occasionally will help them grip the drum much better. The kerosene has a tendency to dissolve the oily matter on the bands, leaving the surface clean.



Member
of



THE
Detroit
ELECTRIC

How Quality Is Built Into Detroit Electric Motors

In the "Silence Room" of our factory, every Detroit Electric Motor—we build our own motors—is subjected to the most severe and far-reaching tests known in electric car building.

Here each Detroit Electric Motor is attached to the rear mechanical system and set in motion. Our experts are the judges—and they demand 100 per cent silence. They vary the speed of the motor, ever listening and examining for the slightest noise, which is but another term for imperfection.

It is the result of friction that ought not exist; it indicates a defect in material or construction.

No motor that fails to run with absolute silence gets by these experts. No motor that develops even the slightest noise is granted immunity. The conditions are exacting; the standards set are high—in keeping with our rigid inspection system. This inspection insures longer life and higher efficiency from every Detroit Electric car; and a maximum of satisfaction and service to Detroit Electric owners at a minimum of expense and annoyance.

Ask for our catalog which states in greater detail how the Detroit Electric leads all in quality, in new features, in range of choice. Write also for information about our opportunity to dealers.

ANDERSON ELECTRIC CAR COMPANY
Detroit, Mich.

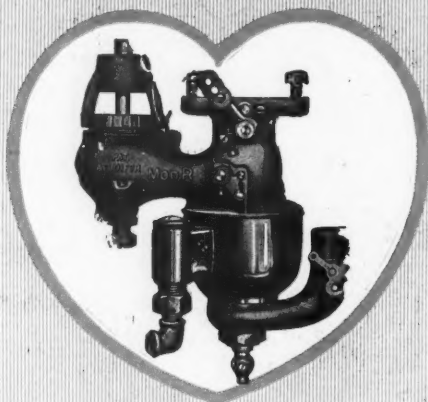
Builders of the Detroit Electric

World's Largest manufacturers of
electric pleasure vehicles



SCHEBLER

Model R



1914

CARBURETOR

*Correct in Principle
Simple of Adjustment
Automatic in Action*

*Sure Starting
Greater Power & Speed
Better Economy*

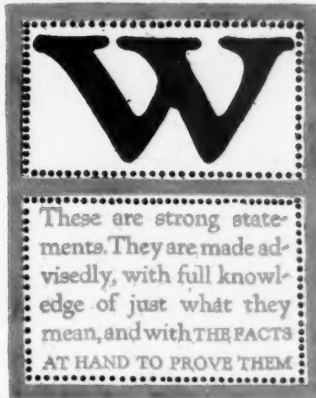
Wheeler & Schebler Indianapolis Ind.
"Pioneers in Perfection of Carburetion"

BRANCHES:

Fry & McGill Motor Sup. Co., Denver, Colo.	Wheeler & Schebler Chicago
Automobile Accessories Co., Pittsburgh, Pa.	Wheeler & Schebler Detroit
Ferris-Dunlap Auto Supply Co., Dallas, Tex.	Fred Campbell St. Louis, Mo.
Interstate Electric Co. New Orleans, La.	W. J. Connell Boston, Mass.
Reinhard Bros. Co. Minneapolis, Minn.	Equipment Co. Kansas City, Mo.
Manufacturers' Supply Co., Philadelphia, Pa.	Elyea-Austell Co. Atlanta, Ga.
Weinstock-Nichols Co. Los Angeles, Cal.	J. C. Nichols New York City
Pennsylvania Rubber & Sup. Co. Cleveland	Weinstock-Nichols San Francisco

Fairbanks, Morse & Co., Ltd., London, England

Canadian Fairbanks-Morse Co. (All principal Canadian Cities)



WHEN you buy a Klaxon you buy the best warning signal made. You buy the signal that has been selected as equipment by the makers of every high-priced car; that is in use today by more than 275,000 motorists; that is known the world over as the STANDARD.

You buy a signal that you can **DEPEND ON**—invariably to clear the road in the country; to get instant attention and action in the noisy traffic of the city; that is equal to any emergency **ANY** where.

You Buy More—You Buy the Klaxon NAME

WHEN we put the Klaxon name on a warning signal, we enter into a contract with the ultimate owner of that signal. We contract to give him complete satisfaction — **INDEFINITELY**. There is no time limit in the Klaxon guarantee.

We want him not only satisfied — but **ENTHUSIASTIC**: and to this end stand ready and willing to go to any expense or trouble.

If he ever has difficulty with his Klaxon; if it ever fails to operate as it should operate; if for **ANY** reason, he is displeased; we stand ready — and **GLAD** — to overcome the difficulty;

to do it promptly and completely.

CHEAP signals — especially the cheap “vibrators” or “buzzers” with which the market is flooded — continually cause trouble. This you know.

When they go wrong they are a total loss.

No one is responsible — no one **CAN** be responsible. They are made cheaply. They are sold cheaply. You get what you pay for.

We believe it is better to sell you **PERMANENT** satisfaction and make you a booster — than to save you a few dollars and make you a kicker.

Klaxon owners are satisfied owners. To make them so and **KEEP** them so is the first obligation of this Company.

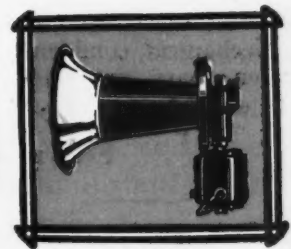


KLAXONET

Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

“The Public Safety Signal”



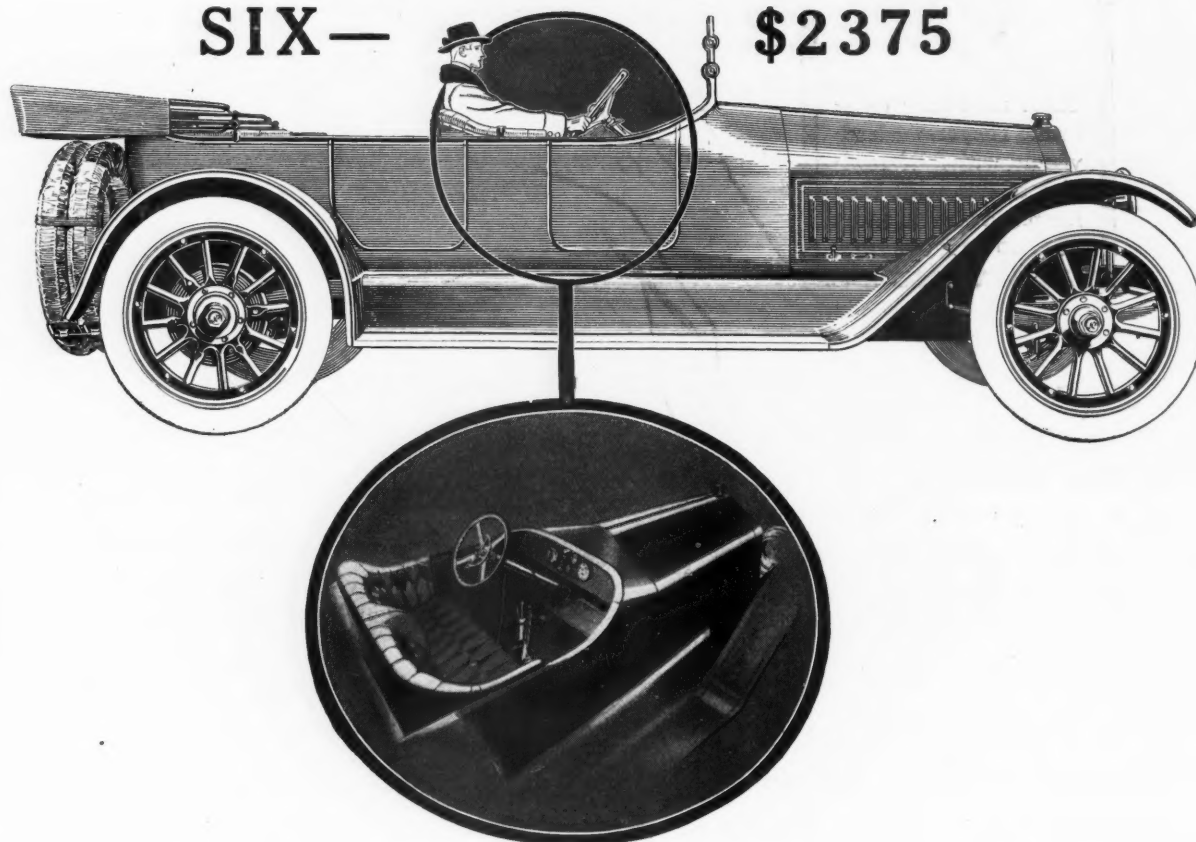
KLAXON

This advertisement planned, written and set up entirely in the Klaxon Factory. Type composition by the Klaxon Press with “Klaxon” type especially designed by Goudy.

National

SIX—

\$2375



Simplicity, Convenience and Ease

Have you ridden in, or driven this new National Six? Until you have you simply can't realize that our claims for its ease of riding, graceful operation, and comfort and convenience are not over estimated. If we told you all that owners say about this beautiful car we fear you would think we were exaggerating.

Note the picture in the lower circle. You see the center control, left side drive, convenient and well arranged dash equipment, access to both front doors, and smart sloping lines to cowl and hood.

When we say, "You don't have to raise the hood," we mean that with a National car you get mechanical confidence; we mean, that our fourteen years' manufacturing success warrant your putting faith in our engineering achieve-

ments. We put the right material in the correct place; we give you performance instead of mere specifications; we give you results and freedom from having to go over the car with a "fine tooth comb" to make sure there are no mechanical mistakes in it. We say that with a National you get 100% pleasure and service, because of the fact that your car is reliable and does not cause you worry about its operating mechanism.

The driver of a National does not have to worry about what is taking place beneath the hood or under the seat. His attention is required no farther than what you can see in the picture in the circle above; the wheel, levers and instrument board. The rest of the car operates with the driver's unconsciousness, because the National company built and guarantees it.

Five models of famous National 40 cars, \$2750 to \$3400

Write Us for Illustrated catalog

National Motor Vehicle Co., Indianapolis, Indiana

When Writing to Advertisers, Please Mention Motor Age.



The Storage Battery With a Service Station

Don't buy a car equipped with accessories made by obscure concerns who have not provided facilities for the proper care or repair of their product when occasion requires.

Especially does this apply to storage batteries used in connection with Electric Lighting and Starting Systems, when the battery becomes vitaly important to the successful operation of the car.



STORAGE BATTERIES

are sold to stay sold and give uninterrupted, satisfactory service through a long life of usefulness.

To insure this result and to protect **GLBA** users, we now have established, in the United States and Canada

166 SERVICE STATIONS

where you can have anything done to your **GLBA** battery that needs to be done—promptly and skillfully.

We are constantly increasing the number of **GLBA** Service Stations, so that eventually, no matter where you live, you'll have **GLBA** service at your instant command.

WILLARD STORAGE BATTERY CO.

Cleveland, Ohio

New York Branch: 136 W. 52nd St.
Chicago Branch: 2241 Michigan Ave.

Indianapolis Branch: 438 and 439 Indiana Pythian Bldg.

Detroit Branch: 736, 738 and 740 Woodward Ave.
San Francisco Branch: 243 Monadnock Bldg.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO

(91)

Which Light Weight

The Chandler is the only six-cylinder car selling for less than \$2000 which has all the following features found on all the leading high priced sixes.

Bosch Magneto for Ignition

Separate Electric Motor for Starting

Separate Electric Generator

Imported Annular Ball Bearings

Large Gasoline Tank in Rear

Used on the Most Famous American Sixes

Packard

Peerless

Pierce [Tank under rear seat]

Locomobile

Lozier

Light Weight Six

CHANDLER \$1785

Built By Men Who Know

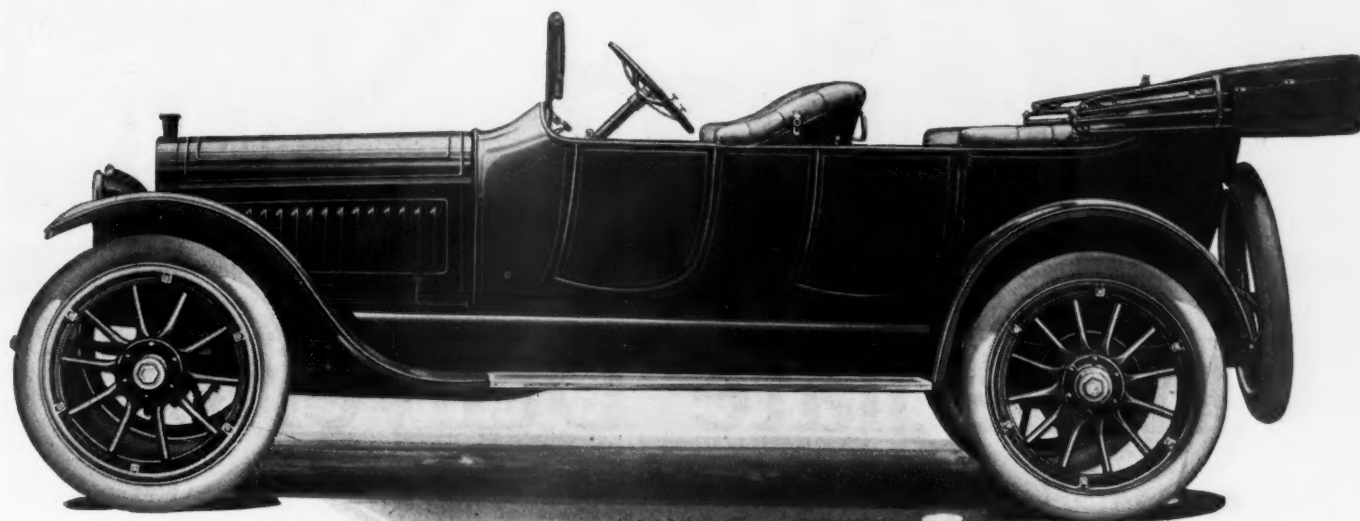
Other Features Worth Demanding

In addition to the above features, each of them instantly ASSURING good service, there are many other features that are characteristic of high-standard design and construction and are found on MOST of the HIGH-PRICED sixes.

The Chandler is the only light six selling for less than \$2000 on which are found ALL of the following features: Mayo Genuine Mercedes Type Honeycomb Radiator. True stream-line body design. No dash, no projections. Crowned fenders. Absolutely clean running boards. Single wire electric system, with wiring run through armored conduit. No side lamps. Double globes in front lights. Cast aluminum motor base, extending from frame to frame. Oiling system all contained within the motor. No outside piping. 3 Imported Coventry chains, instead of noisy gears, to drive camshaft, pump and generator. These chains run silently in a constant spray of oil. Left-side drive and center control—multiple disc steel and raybestos clutch—demountable rims—Stromberg Carburetor, with hot air and dash priming attachment—double internal enclosed brake drums—triangle section torsion rod, with forward end fitted with double spring buffers—deep 10 and 12 inch cushions.

Chandler Motor Car Co., 203-233 E. 131st St., Cleveland, Ohio

"Six" Will You Sell?



**Light Weight
Six**

CHANDLER \$1785

**Built By Men
Who Know**

Read that full page of features carefully. As an experienced automobile man you know the Chandler is RIGHT. If you studied the workmanship of the Chandler chassis at the shows you know it is the highest grade light six in the market.

You surely INTEND to sell a light weight six this year. The market for cars above \$1500 is distinctly a six-cylinder market. And the LIGHT SIXES have the call. You haven't any time to lose in securing a desirable agency.

CONSIDER CAREFULLY the Chandler and the three or four other well-known light sixes. Compare values in detail. Consider the six-cylinder experience of the builders.

A full season's service in the hands of hundreds of owners all over America has not developed a single mechanical weakness in the Chandler. We know of no way to improve the Chandler chassis. The new body design is the ultimate in graceful beauty.

Four types of body: Five-passenger touring, \$1785; a handsome runabout, \$1785; four-passenger coupe, \$2485; limousine, \$2985. Wheel-base 120 inches.

Regular equipment includes, in addition to equipment items already named, Jiffy curtains, 8-day clock, Jones speedometer, rain-vision clear-vision ventilating windshield, Bair patent top holders, Pantasote top-boot, instantly adjustable tire carrier in rear of tonneau, carrying tire without straps, etc., etc.

Write or wire us today regarding your territory. Catalogue and detail information on request.

Chandler Motor Car Co., 203-233 E. 131st St., Cleveland, Ohio

Vulcan 27

• The •
World's
Greatest
Light Car

Immediate Deliveries

Mr. Dealer! Perhaps you are one of the hundreds of dealers who visited and admired the Vulcan display at the big Auto Shows this winter. Possibly you said:

"This is a splendid car. Your price of \$750 is right! It is the only price at which a man's size car can be made and made right. It is a car that will appeal to my customers—but can you make deliveries? If you can, it is the car I want to handle."

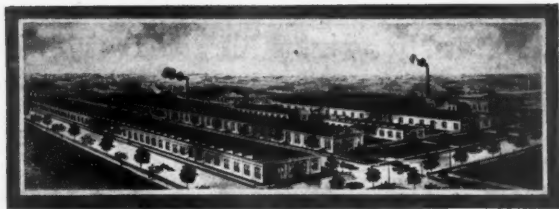
Now, Mr. Dealer—we want to set your mind at rest on the delivery point. **We are making carload shipments daily.** We can and will fill any reasonable demand you make on us for this car. **And that goes.**

Two years of building and planning; two years of installing special machinery and making special tools were required to enable us to bring "The Vulcan 27" to its present high state of efficiency.

Quantity Production—is absolutely necessary in order to produce this car at the minimum of labor cost and at the same time to maintain the highest degree of perfection. This is the **only way** that the cost of production can be reduced to a point where it is possible to furnish this high grade car at a popular price.

Not an Assembled Car—The Vulcan is not an "Assembled Car." The building of the chassis complete (including axles, transmission, steering gear, clutch, etc.) and every part that enters into these various units is done in our own shops. We even build our own bodies. Our castings are made in our own foundry. The sheet-metal work (for bodies, hoods and fenders) is done in our own shops by the most modern machinery, designed for economical production.

The "Vulcan" is so thoroughly standardized, every part so accurately made to gauge, that each part in one car will fit into every other car that we produce.



Throughout the entire chassis the most complete harmony is maintained. The result is that each little part in the "Vulcan" can be depended upon to perform its function in the finished car. Every part is as perfect as every

The Vulcan Manufacturing Co., Painesville, Ohio

When Writing to Advertisers, Please Mention Motor Age.

other part. We realized that a single imperfect nut or screw would prevent basic harmony. That's why you'll find no files or reamers in the Vulcan assembling room. Everything slips into place with exact fit.

Rigid Inspection—No car leaves our factory until every individual part has demonstrated that it is perfect. It must be accurate to a fraction of one-thousandth part of an inch.

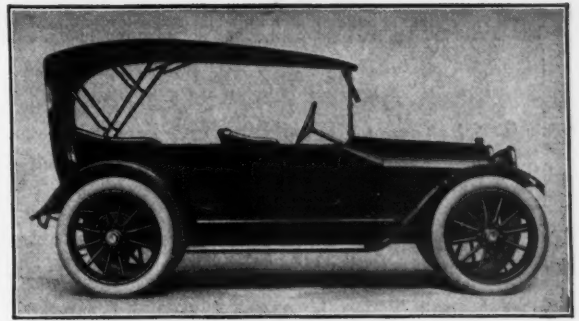
Quick Deliveries—We are in a position to meet and take care of a big consumer's demand for the "Vulcan 27" Speedster. Let us emphasize the fact that our ability to make immediate and continuous shipments means profit for you and satisfaction for your customers.

When you deliver a "Vulcan 27" to a purchaser you are giving him 25% more real value for the money. Every buyer of a "Vulcan" is a "Booster" for the dealer who sold it to him.

For Live Dealers—We want a few more live wire dealers to sell—not merely handle—the "Vulcan," as we have taken steps that will enable us to turn out a great many more of these cars this year than we anticipated.

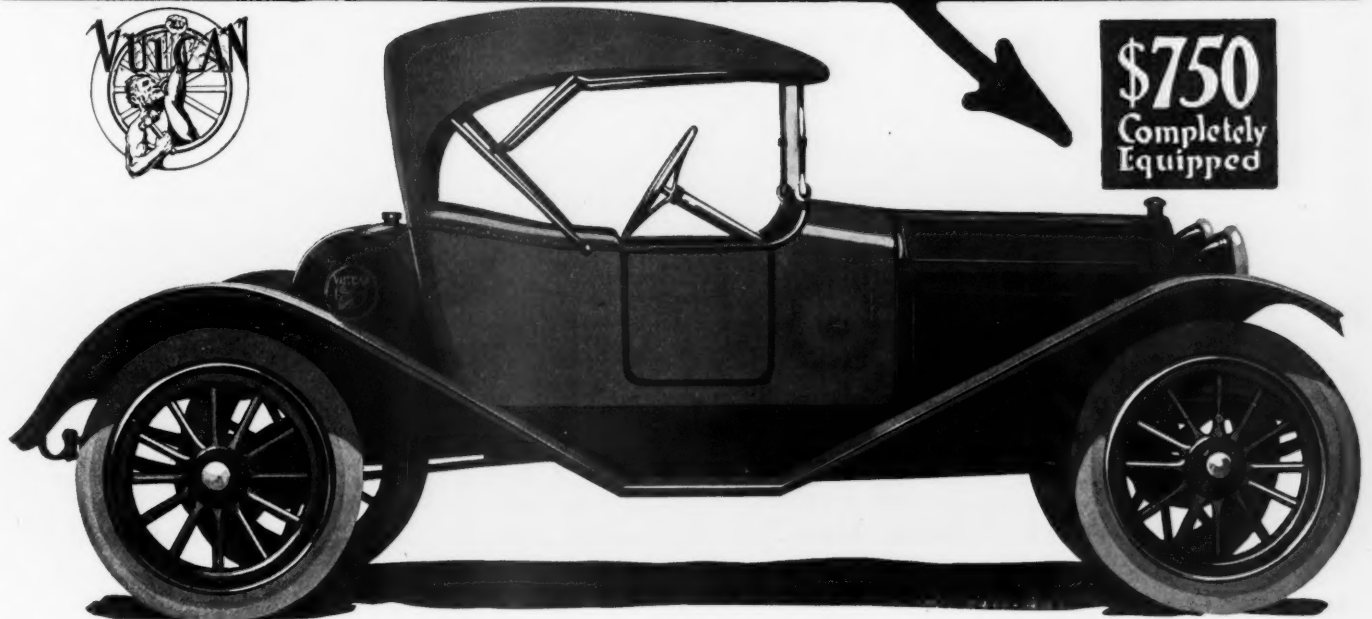
The Vulcan Platform

27 Horse Power.
3 3/4" Bore, 5" Stroke.
Unit Power Plant, 3-point suspension.
105" Wheelbase Speedster.
115" Wheelbase Touring Car.
32x3 1/2" Tires all round.
3-Speed Sliding Gear Transmission, chrome nickel steel gears.
5-Pinion Bevel Gear Differential.
Left Side Drive. Center Control.
"Streamline" Bodies.
Electric Lights.
Full Equipment, consisting of Top and Slip Cover, Windshield, Speedometer, Electric Lights and Horn, Tools, Jack and Q. D. Rims.



Don't Lose Any Time In Getting Our Proposition

We are only going to take on a few more dealers, as it is not a part of our policy to contract to deliver more cars than we can produce.



The most liberal ever offered to dealers. We give more and ask little. Write or come today

When Writing to Advertisers, Please Mention Motor Age.

CIRCULATION

THAT SELLS ALL PRODUCTS OF
THE AUTOMOBILE INDUSTRY

JANUARY FACTS

THE AUTOMOBILE—total.....	95,493
Average per issue (weekly).....	19,099
Published at 239 W. 39th St., New York	
MOTOR AGE—total.....	117,929
Average per issue (weekly).....	23,586
Published at 910 So. Michigan Ave., Chicago	
MOTOR WORLD—total.....	42,400
Average per issue (weekly).....	8,480
Published at 1600 Broadway, New York	
MOTOR PRINT—total (monthly).....	44,759
Published at 418 Sansom St., Philadelphia	
	<hr/>
	300,581

This circulation represents no waste. Covers automobiledom.
Gets the story direct to the big power that purchases.

For rates, closing dates, etc., address

THE CLASS JOURNAL CO.

239 West 39th Street, New York

910 S. Michigan Ave., Chicago

SOLD

6000 CARS IN 60 DAYS

That tremendous merchandising success was scored by the Thos. B. Jeffery Company during November and December, 1913. It is doubtful if that great record was ever approached by another manufacturer of high quality cars.



THEREFORE THESE FACTS ARE IMPORTANT

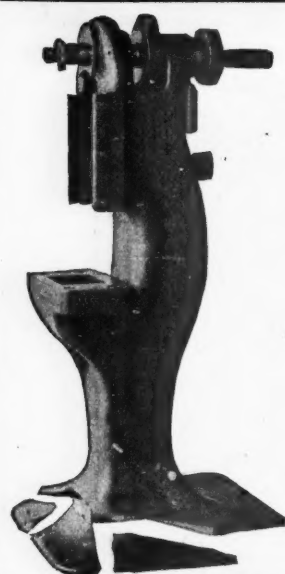
In the issues of October 30, 1913, of THE AUTOMOBILE, MOTOR AGE and MOTOR WORLD, the Jeffery company ran a splendid six-page advertisement in which was set forth the big story of its new 1914 products. During the period of time above mentioned it has scored this tremendous success—6000 cars in 60 days.

These publications were selected because of their recognized worth, and because the subscriber clientele of these three journals can absorb the entire product of the Jeffery company—can absorb the product of your company.

If you saw the February seventh issue of the Saturday Evening Post you may have noticed a half page advertisement of the Jeffery company where, after declaring its big merchandising success, it stated as follows:

“... That means more than success. These men know. They visit the various motor car plants. They read the trade journals,” etc., etc.

It is not claimed that these three publications were entirely responsible for this big Jeffery success, but their influence throughout motordom (motorists, prospective motorists and dealers) was tremendous—and in the right direction.



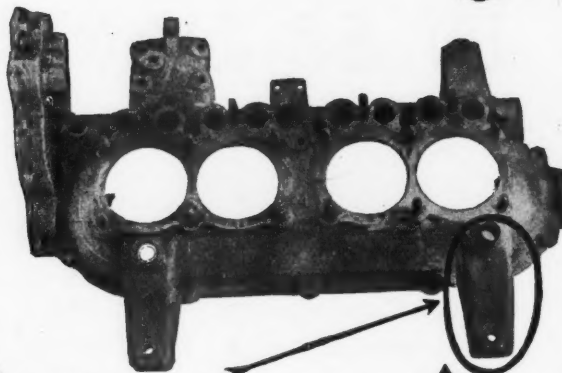
Casting Weighing 1600 lbs.
Worth \$180.00



Welded at a Cost of \$4.00



Broken Crank Case
worth \$90.00



Welded at a Cost of \$2.50



Broken.

After Welding.

After Grinding.

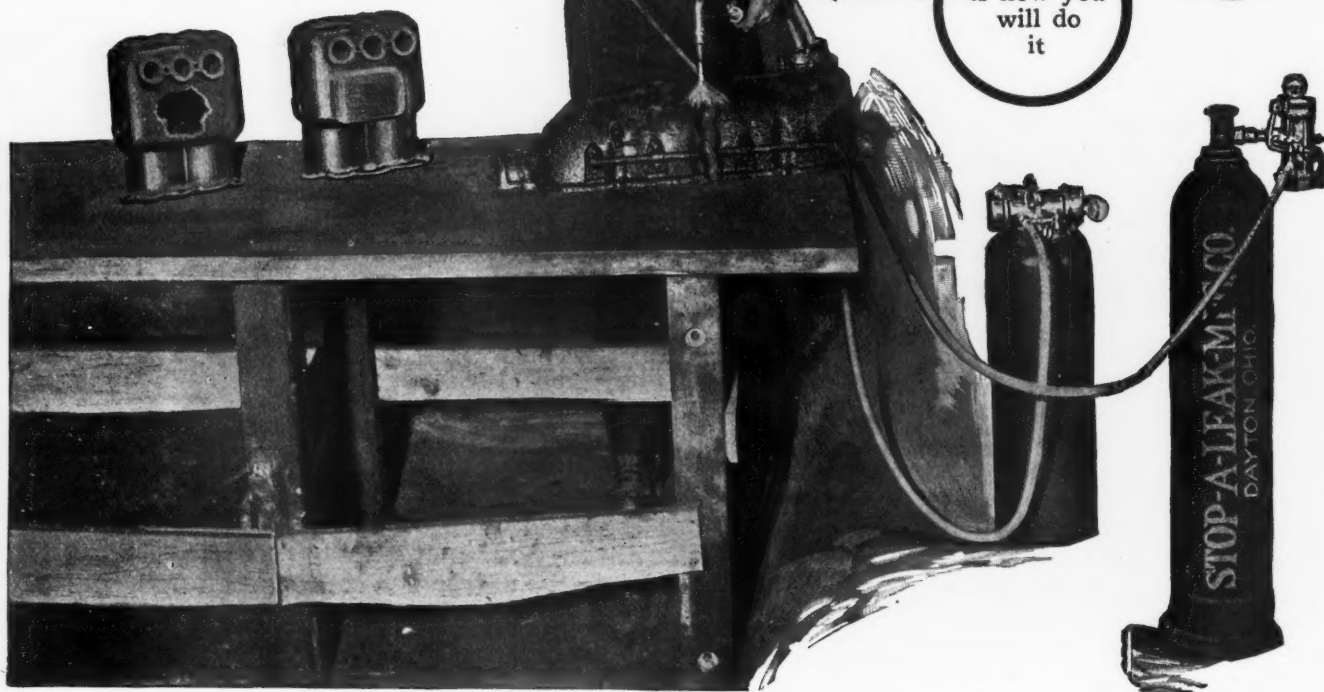
You Will Say,
"Oh, How Easy"



This is
what you
will
do

This
is what you
will do it
with

This
is how you
will do
it



When Writing to Advertisers, Please Mention Motor Age.



The Dayton Reducing Valve
CORRECT IN PRINCIPLE
SIMPLE IN ADJUSTMENT
Automatic in Action

Designed especially
 For decarbonizing and welding or cutting purposes.
 For reducing gases of high pressure to a safe working pressure.
 Don't risk life and property on a cheap reducing valve.
 The Dayton decarbonizing and welding valve is so designed as to eliminate every possibility of a flashback or danger in any form, which is the great objection to cheap valves.
 This valve will pay for itself in 30 to 60 days' use, by its saving in gas over a cheap valve.
 Price complete with all hose and fittings, \$25.00



The Dayton Welding and Cutting Torches
 Indorsed by American and foreign engineers. In accuracy, in material, in workmanship, and above all, in service, **DAYTON TORCHES ARE BEST BY TEST.** This statement is based solely upon the performance of our product.

THREE TIPS
 No. 1 for Heavy Castings.
 No. 2 for Light Castings and Heavy Sheet Work.
 No. 3 for Light Sheet Work.
 Price complete with all fittings, hose, etc., \$25.00

Monarch
System of Oxy Acetylene Welding and of Carbon Removing
GARAGES,
 Manufacturers, Contractors, Machine-shops, Foundries, Steel-mills, Railroad-shops, Street Railways

In making broken parts as good as new, and simplifying manufacture, the **MONARCH** system has worked wonders.

GARAGES—Use this machine for Welding, Brazing, Straightening, Soldering, Removing Carbon, etc.

Automobile and other factories use the **MONARCH** system for reclaiming defective castings, filling up misplaced holes, adding bosses, etc.

Weld any casting.
 Braze buggy tire wires instantly.
 Weld split pipe.
 Correct mistakes in design.
 Weld and straighten frames.
 Bend steel rails—1/10 the cost, 1/10 the time.
 Boiler makers, make boilers and tanks any size, any pressure, any gauge, without a rivet.
 Stronger, look better, and cost less, and sell for more money.
 Also weld cracks from and between rivets.
 Cracked tube plate bridges, broken mud rings, door frames, etc.

The Field for the Monarch Welder is Unlimited.
WRITE TODAY FOR PRICES AND FULL PARTICULARS
Monarch Manufacturing Company
523 Stillwater Ave.,
Dayton, Ohio

EQUIVALENT TO EQUIPPING A SPRING WITH 10,000 OIL CUPS!

Imagine the FLEXIBILITY, the VIBRATION ABSORBING qualities of a spring comprising 10,000 oil cups in its construction — 20 oil cups to every square inch of wearing surface! Your car rides on practically 40,000 CUSHIONS of oil if equipped with—

The OIL CUSHION SPRING DANN INSERT

"The Insert of 10,000 Oil Pockets"

Consider that these 40,000 oil cups do not require refilling every few weeks. ONCE THE DANN INSERT IS BOLTED AND CLIPPED BETWEEN YOUR SPRING LEAVES, PERFECT SPRING LUBRICATION IS YOURS FOR FROM TWO TO THREE YEARS! It is a PHYSICAL IMPOSSIBILITY for the lubricant to squeeze out. It is practically hermetically sealed in the little oil pockets.

Consider that permanently and perfectly lubricated springs will, by adding to the life of your car, increase its value to you out of all proportion to the nominal cost of equipping with the Dann Insert.

Consider that the Dann Insert will PAY FOR ITSELF many times over in the wear it saves on your tires alone. Add to that PERFECT RIDING COMFORT—sliding along all roads as if they were boulevards—all the car-killing "kick," jolt and jar of improperly lubricated springs GONE—and you have some idea of the crying NEED of equipping every car in use with the Dann Insert.

The Dann Insert is a thin, perforated strip of specially compounded metal designed to be inserted between the spring leaves from tip to tip. The perforations in the Insert are packed with a heavy lubricant. A thin membrane on top and bottom of the Insert prevents the lubricant being dislodged from these oil-pockets in the course of installation. Once the Insert is installed spring motion causes this membrane to assimilate with the lubricant.

Pat.
May 11, 1909.
Other
Patents Pending

Dealers!

We want dealers, garagemen and repairmen everywhere to act as our agents. You meet with no competition. Every car and truck user in your vicinity is a live prospect. The Dann Insert offers greater sales opportunities than any accessory today on the market. Every motorist who values long car life and perfect riding comfort, sooner or later has got to come to the Dann Insert. Prepare for the spring trade. Get our agency plan today.

The Dann Insert is standard equipment on the Borland Electric, the Standard Motor Truck made in Warren, Ohio, and other leading makes of motor cars.

FORD MOTORISTS!

THE SCHAEFER SALES CORPORATION, 1501 ARCADIA BLDG., DETROIT, MICH., is prepared to supply Ford owners with Dann Ford Insert—cut to proper lengths, neatly packed in a box, and ready for immediate installation between the spring leaves of any Ford car. Complete instructions accompany each order, making it an easy matter for you or your garageman to "Oil Cushionize" your Ford springs with the utmost despatch.

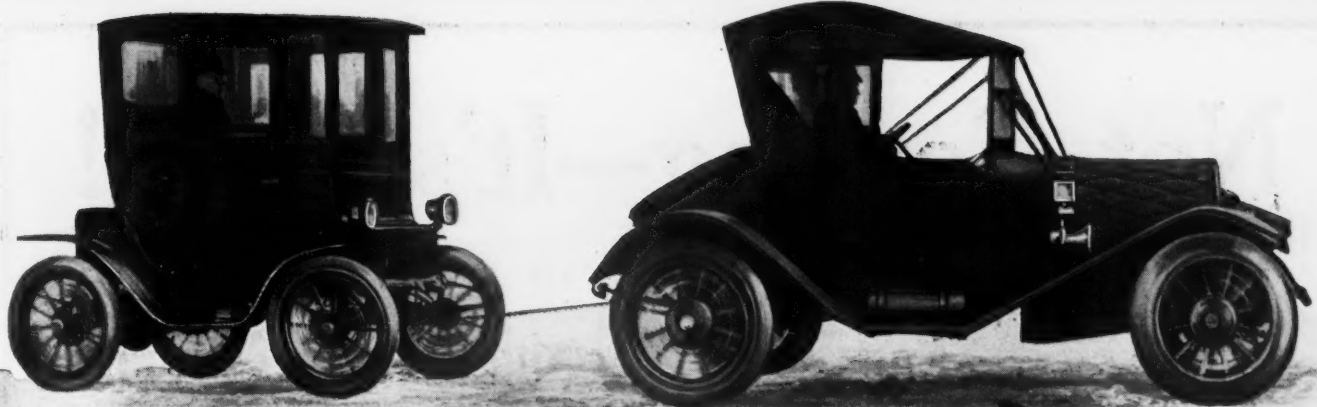
"Oil Cushionize Your Springs!"

Dann Oil Cushion Spring Insert Co.

2246 Indiana Avenue,

Chicago, Ill.

X-Ray
view of
Spring equipped
with Dann Insert



\$15

Complete

With Hub Cap to Fit Any Electric Car

← **An Ounce of Prevention** } vs. { **A Pound of Cure**

Which had you rather do,—run the constant risk of completely exhausting the batteries of your electric car, and having to be towed to the garage; or, *prevent* battery exhaustion by having your electric car equipped with a

Stewart Hub Odometer

Which informs you at any time exactly how far you have gone and how far it is safe to go.

It is impossible to "guess" how many miles your electric will travel on one full battery charge. It is impossible to "guess," after you have driven a while, how many miles the remainder of the charge will carry you. "Guessing" is certain to leave you stranded sooner or later. Then comes the humiliating, expensive, annoying experience of being towed home.

The Stewart Hub Odometer *prevents* all this. Read it when your batteries are fully charged, and again when they are nearly exhausted. The difference between these two readings is the distance, in miles, that a full charge will take you. Watch your Stewart Hub Odometer, and keep *within* that distance. Then you are safe from any towing "experience."

Do not think of depending on any less reliable instrument for this information. The Stewart alone is unfailing. It is the first instrument of its kind to be made proof against mud, water and oil. Nothing can enter or injure it. It has no unreliable springs, pawls and ratchets. Its drive is positive, through worm and spiral gears. Its dials are moved and controlled by our Geneva stop mechanism, which allows only the right dial to be moved at the right time. The Stewart Hub Odometer can be attached to the hub of any electric car or truck. It registers to 100,000 miles and tenths of a mile, and repeats.

This prevention is a thousand times better than the cure. The Stewart Hub Odometer costs but \$15 (including hub cap to fit any electric car or truck). Have a Stewart Hub Odometer attached to your electric car without delay. Order one put on your *new* electric before it is delivered to you.

Stewart-Warner Speedometer Corporation

Factories: Chicago, Ill. and Beloit, Wisc.

Direct Factory Branches:

Atlanta, Ga.
Boston, Mass.
Buffalo, N. Y.
London, Eng.

Chicago, Ill.
Cleveland, Ohio
Detroit, Mich.

Indianapolis, Ind.
Kansas City, Mo.
Los Angeles, Cal.

Minneapolis, Minn.
New York, N. Y.
Philadelphia, Pa.

Pittsburgh, Pa.
St. Louis, Mo.
San Francisco, Cal.
Paris, France

And Service Stations in all cities and large towns

When Writing to Advertisers, Please Mention Motor Age.

Not Coming—It's Here!

The Most Potent Factor in the Automobile Industry—and that Means in the World



Maxwell ²⁵/₄ \$750

Shipping 100 cars per day now—and just getting into our stride. 200 cars per day in April.

500-car days our objective—just as fast as machinery can be made and installed and men trained.

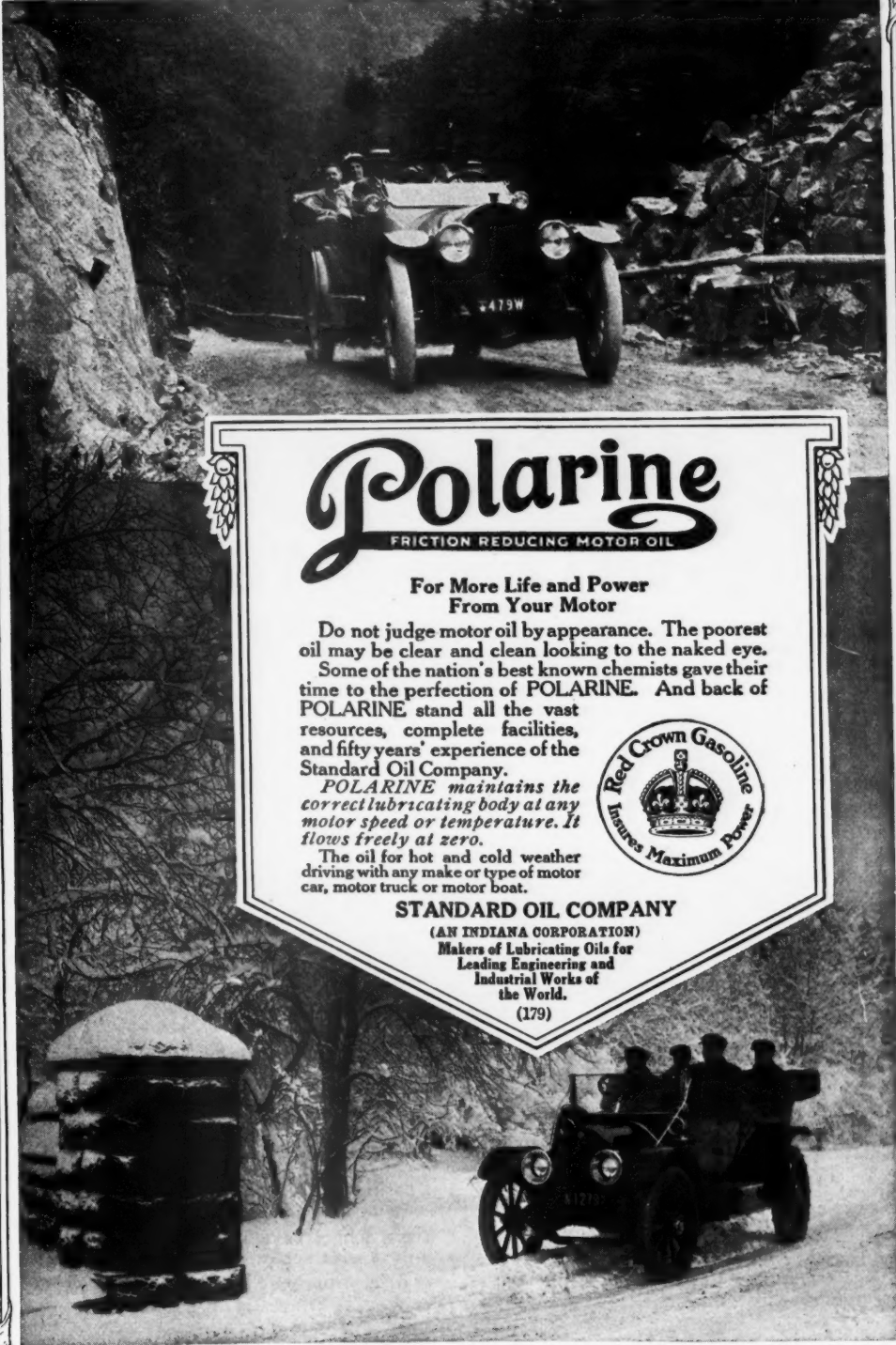
By the way—where now are those who said we couldn't? What have they accomplished—where are they?

Maxwell Motor Company, Inc.

Detroit

Michigan

Dealers and Service Everywhere



Polarine

FRICTION REDUCING MOTOR OIL


**For More Life and Power
From Your Motor**

Do not judge motor oil by appearance. The poorest oil may be clear and clean looking to the naked eye.

Some of the nation's best known chemists gave their time to the perfection of POLARINE. And back of POLARINE stand all the vast resources, complete facilities, and fifty years' experience of the Standard Oil Company.

POLARINE maintains the correct lubricating body at any motor speed or temperature. It flows freely at zero.

The oil for hot and cold weather driving with any make or type of motor car, motor truck or motor boat.

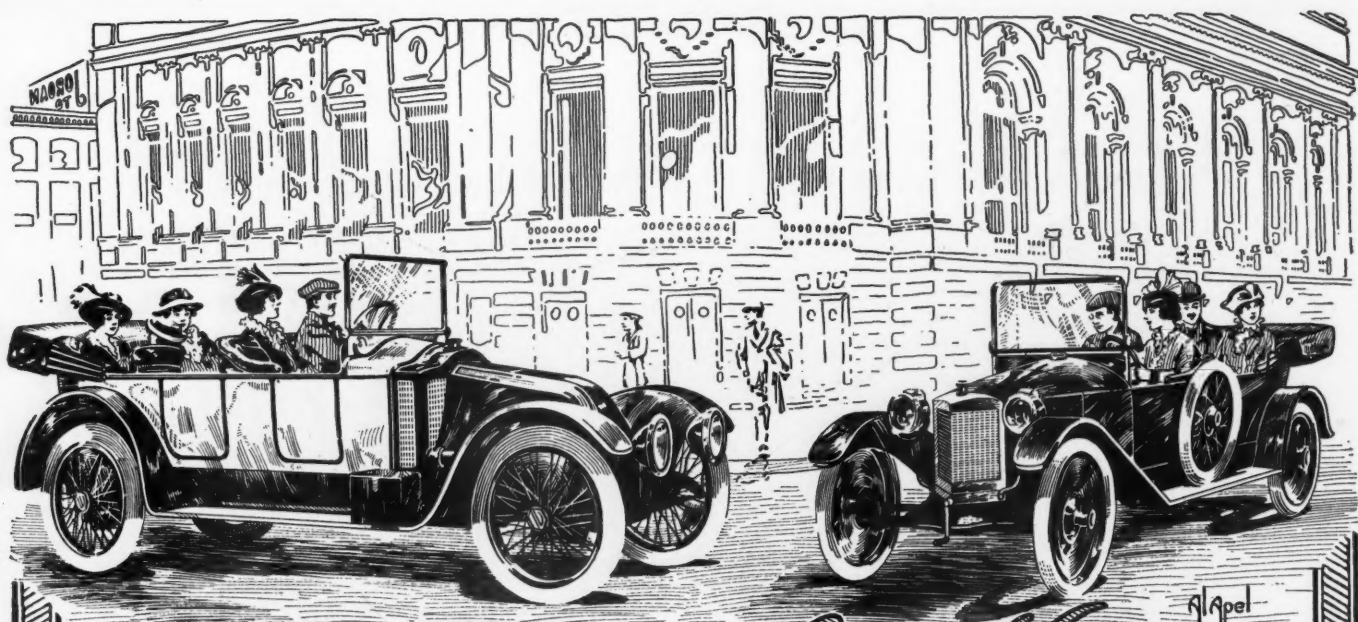


STANDARD OIL COMPANY

(AN INDIANA CORPORATION)

Makers of Lubricating Oils for
Leading Engineering and
Industrial Works of
the World.

(179)



Keeton Car-Nation

Two Cars That Command Your Attention

The New Keeton Six is not ordinary in any sense of the word.

Distinction is written all over it.

The Keeton Six is a car that commands instant attention in any company—that stands out from the rest—a pleasing, powerful exponent of "class."

In the Keeton Six you secure a "foreign" car in all the essentials, as it ranks with the finest products of Europe in design, construction and finish, yet—its price is only about one-half that of an European car.

The mechanical features of the Keeton are of the highest order, based on sound engineering principles.

Keeton Specifications and Equipment

First, don't overlook the length—wheel base of 136 inches—seats for seven and room for more—then the motor, six cylinders, 48 horse power, very silent, most powerful.

Four speeds forward transmission, improved cooling system with radiator back of the hood instead of in front.

Electric starting and lighting, five interchangeable wire wheels, 4½ inch tires, power tire pump.

All these, together with the regular accessories, make the Keeton appeal to those who like distinction, combined with comfort.

Price, F. O. B. Detroit, Keeton seven passenger, \$3250. Two passenger body, if desired, at same price. A full line of open and closed bodies.

The Car-Nation is Standard in every way and the leader of the small car class.

It has all the good qualities in style and performance of the high priced cars—yet has light weight and low initial and up-keep costs.

See that "V" shaped radiator, notice the strong wire wheels, also the stream line body—there is "class" enough for the most exacting.

It has "American snap" combined with a foreign appearance.

As a Car-Nation dealer you could fill your territory with Car-Nations. It appeals to people in all walks of life.

Car-Nation Roadster \$495 Touring Car \$520, as Catalogued

This "big little car" has a unit power plant, with 4 cylinder motor, large valves and bearings, silent and powerful.

Has three speeds forward and reverse, bevel gear drive with one universal joint. Hyatt Roller Bearings in rear axle.

Wire wheels 30x3 inches, demountable, clincher tires, wheel base 104 inches, horn, head and tail lamps with set of tools.

Prices, two passenger Roadster, \$495; four passenger Touring Car, \$520, as catalogued.

A card asking for our "Triple Test" Booklet will be promptly answered

The American Voiturette Company
Detroit, U. S. A.

Why?



Why-

does the Northway Motor & Mfg. Co. spend \$150,000 more for Rich Tungsten Valves than was formerly paid for ordinary valves?

Why does the Mitchell-Lewis Motor Co. spend \$50,000 more for Rich Tungsten Valves than they spent for their former valves?

Why does the Chalmers Motor Car Co. spend \$80,000 more for Rich Tungsten Valves than their former common valves cost them?

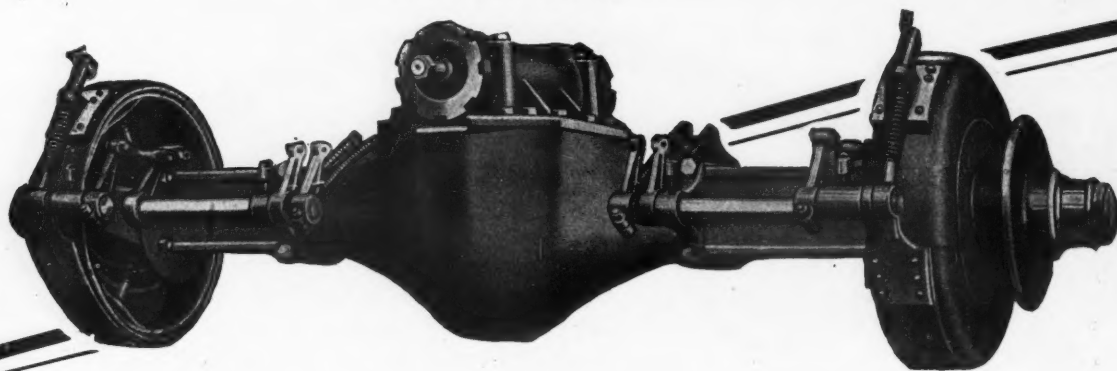
Why will each of the leading motor car builders represented above spend **thousands of dollars more** for Rich Tungsten Valves for their 1914 models than the common valves cost them in the past?

There is a mighty good reason. It is told briefly, plainly and in a very interesting way in our free booklet — "Reasons for Rich Tungsten Valves." Send for a copy today. Learn about the valves that never pitted, warp, leak or need regrinding. Prices gladly quoted on any size and any quantity.

RICH TOOL COMPANY, 414 Railway Exchange Bldg., Chicago, Ill.



Condition of Rich Tungsten Valve After 3411 Miles. Note Glass-Like Surface of Seat



Do You Know What Sheldon Worm Drive for 1914 Means?

IT MEANS A MORE POWERFUL TRUCK because there is only a single reduction—little power is lost in transmitting the power from the motor to the rear axles.

IT MEANS A SILENT TRUCK—fewer parts are required for its construction, and these are enclosed and work in oil.

IT MEANS AN UP-TO-DATE TRUCK — Today the demand is for the thoroughly proved worm drive.

IT MEANS AN EFFICIENT TRUCK because it receives its power direct from the motor and is made of less parts than any gear-driven axle. This axle unquestionably delivers the maximum power to the wheels, and they move the truck.

And finally, it means better service to the owner — and increased sales for the manufacturer.

DON'T JUDGE A WORM DRIVE TO-DAY BY WHAT YOU KNEW OF IT FIVE OR TEN YEARS AGO. THE SHELDON WORM DRIVE FOR MOTOR VEHICLES HAS MORE THAN KEPT PACE WITH THE RAPID STRIDES OF THE INDUSTRY ITSELF.

Write for Detailed information.

Sheldon Axle Co., Wilkesbarre, Pa.

Chicago Branch
68 E. 12th St.

San Francisco Branch
444 Market Street

Detroit Branch
1215 Woodward Ave.

MERCER

Again Proves Its Wonderful Ability

FIRST IN GRAND PRIZE SECOND IN VANDERBILT

A Mercer, driven by Edwin Pullen, won the world-famous Grand Prize race at Santa Monica, Cal., Feb. 28, averaging 77.2 miles per hour for the entire distance, 404 miles.

At 300 miles the Mercer's average was slightly over 79 miles per hour—a new road record for the distance. The former Grand Prize record was broken, and a new world's record for 400 miles was established.

The second car to finish was 40 MINUTES behind the Mercer. The fourth car, a Mercedes—one of Europe's best—was ONE HOUR behind.

An average of 77.2 miles means that the Mercer was traveling over 100 miles an hour on the straightaways.

In the Vanderbilt Cup Race, Feb. 26, a Mercer, driven by Barney Oldfield, was second—only ONE MINUTE behind the Mercedes. The Mercer's average in this race—294 miles—was 75 miles per hour.

Had it not been for an unfortunate puncture on the 32d lap, which cost the Mercer slightly more than a minute, the result would doubtless have been different.

These remarkable victories again stamp the Mercer as being of superior construction. They were not achieved through any chance or luck, but were absolutely the result of merit.

The Mercer is not a one-time winner. For four years it has participated in speed contests of every description, being a consistent winner at all times.

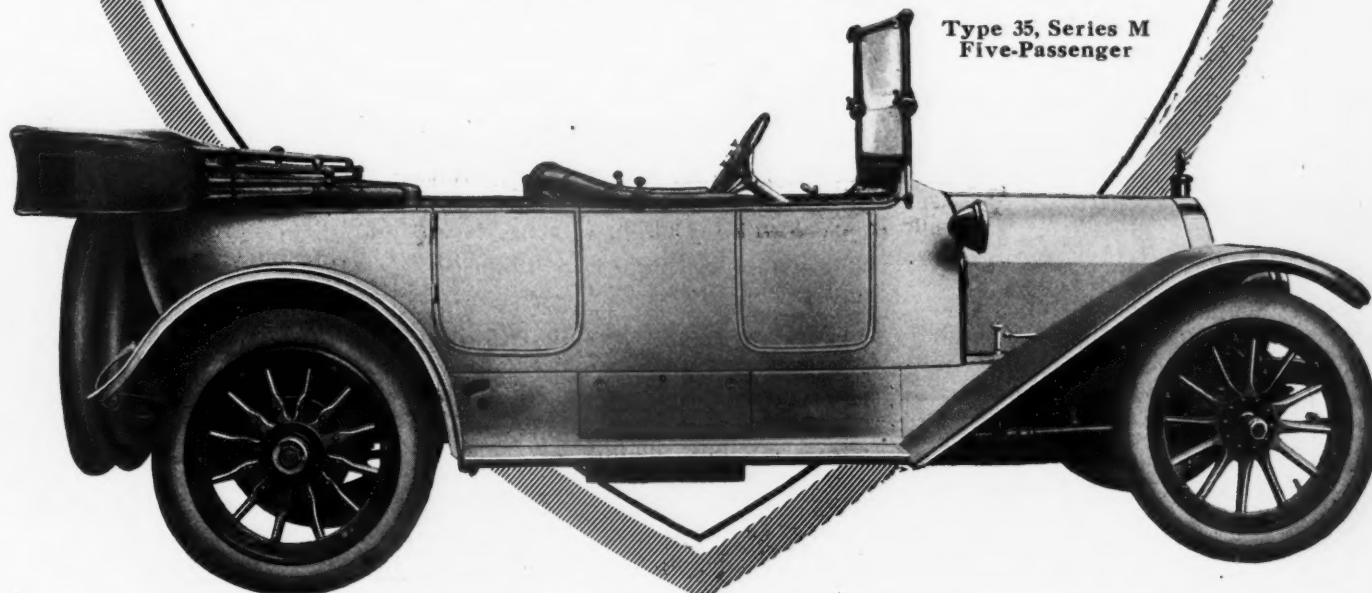
This latest demonstration of Mercer endurance and efficiency should have great significance for the prospective buyer of an automobile.

Embodied in all Mercer models are the lessons we have learned from racing. Every car produced is built with the same regard for accuracy that made these victories possible.

Catalogue sent on request. Some desirable territory still open for live dealers

MERCER AUTOMOBILE CO., 800 Whitehead Road
TRENTON, N. J.

Type 35, Series M
Five-Passenger



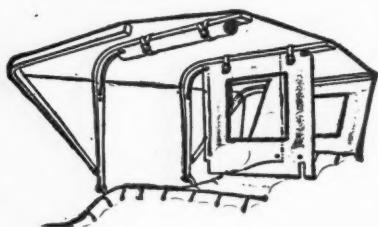
When Writing to Advertisers, Please Mention Motor Age.

You don't have to get out—you sit right in your seat—Snap!—Snap! Collins Curtains go right in place—stay there—and protect your car from the heaviest downpour.

Collins *Always Ready* Curtains

There's no trying one piece all over the car before you find out where it fits. Collins Curtains are strapped to the bows under the top, right at your fingers' ends. Just undo the straps and they slide right into place.

It isn't ever necessary to have the occupants pile out—day or night you'll find Collins Curtains in their regular place, ready for instant service.



Collins Curtains are now regular equipment on Cadillac, Chalmers, Moline, Paterson, Winton, Stearns-Knight, Cole, Haynes, Pullman, Havers, Herreshoff, Jeffery, National, Lyons-Atlas, Apperson, Moon, Velie, Davis, Speedwell, Jackson, Pratt, Palmer, Stanley, McFarlan, Henderson, Kline, Lexington and Pope-Hartford cars.

You can have Collins Always-Ready Curtains on your new car.

You can have Collins Always-Ready Curtains on the car you are now driving.

We license top manufacturers to furnish Collins Always-Ready equipment with new tops or to equip old tops.

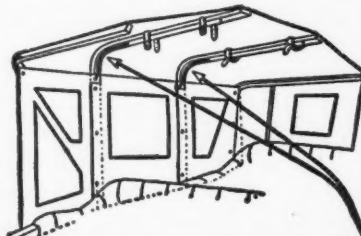
To Ford Owners: We can furnish Collins Always-Ready Curtains for Ford cars.

Any top builder can and will apply them for a nominal charge. The Collins attachment is applicable to any top and to your old style curtains.

There are some imitations and evasions of the Collins patents, which in some respects resemble Collins Curtains, but they do not have Collins advantages.

Collins Curtains do not interfere with the lowering or raising of the now popular "one-man-top"—there is no cable or mechanism to get in the way and obstruct operation.

You can enjoy the many advantages of Collins Curtains if you but specify them for your new car. Most manufacturers and dealers will comply with your request if you make it *emphatic* enough.



Always look for the exclusive Collins curved bracket bar and the Collins license tag.

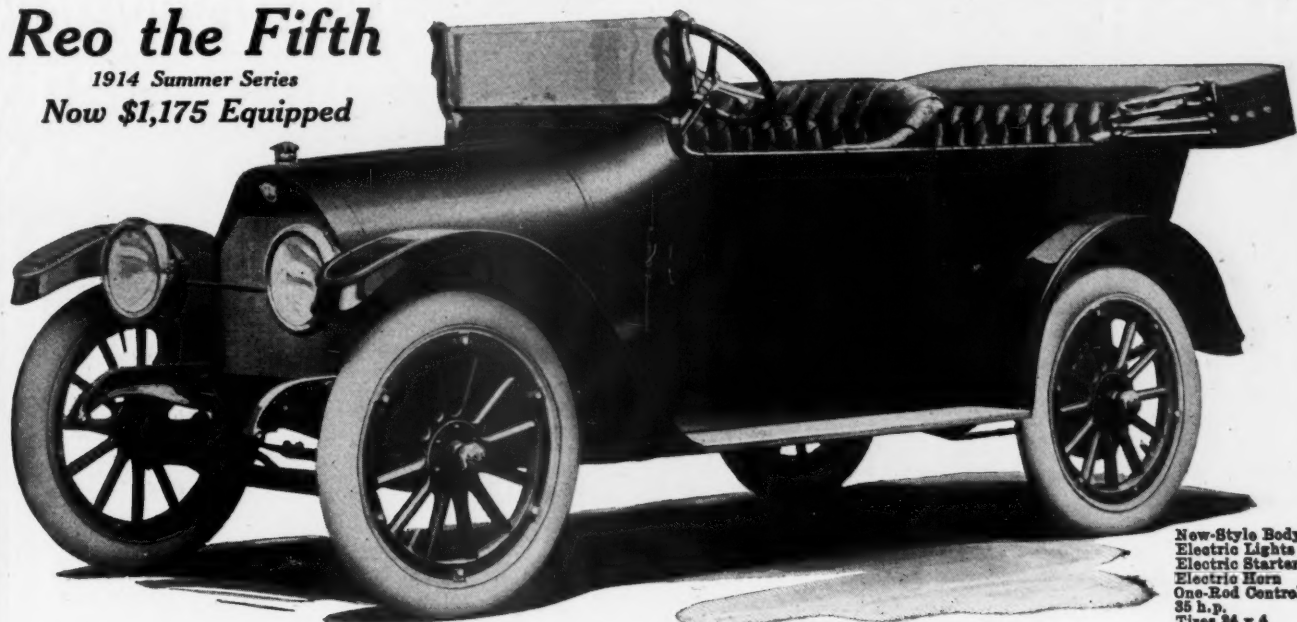
If you care to examine the Collins Curtains, you can do so in the display rooms of any car having them as regular equipment. Write us, and we will arrange, without obligation to you, for you to see them.

Novelty Leather Works Dept. B
Jackson, Michigan

Reo the Fifth

1914 Summer Series

Now \$1,175 Equipped



New-Style Body
Electric Lights
Electric Starter
Electric Horn
One-Rod Control
35 h.p.
Tires 34 x 4
Also Roadster

All We Can Ever Give

A chassis designed by R. E. Olds, as his final model—as the best he knew—after 25 years of car building.

A car built slowly, in a costly way, as though each car were built for Mr. Olds' own use.

A body of the coming type—a streamline body, believed in Europe to mark the limit in automobile beauty.

Equipment which includes, we think, all that motorists desire.

A price \$220 less than last year

—now offering a value which, in all probability, no factory ever can excel.

Thus Reo the Fifth of this year fulfills all our ambitions—even all our dreams—after 27 years in this industry.

Now the Last Step—\$220 Saved

Reo the Fifth came out three years ago. Since then, the sole attention of our experts and designers has been given to its perfection.

We have kept test cars running on the road, up to 10,000 miles per car. These cars are then taken apart and inspected. And every betterment which use suggested has been adopted in the chassis.

We have improved the finish and upholstery, the body design and equipment, until the whole car now measures up with the chassis. In none of these respects can we see any hope to do better.

Now comes the last step.

When we equipped this factory to build this car we made an enormous investment. Automatic machinery, testing machinery—everything necessary to

build well and build cheaply. Engineers have come from everywhere to inspect this model plant.

But we counted that investment final. Models thereafter were not to be changed. And we knew that sometime—when enormous output had repaid that investment—we could quote on this model a matchless price.

That time has come. This year we reduce our price 16 per cent. Last year's Reo the Fifth, completely equipped, sold for \$1,395. This year's price, with a better body and better equipment, is \$1,175.

Just as Costly

Yet the car is just as costly, save for lower prices on tires and electric starters.

It is still built of steel made to formula—steel an-

alyzed twice. All parts must still pass the same radical tests. All driving parts, as always, have 50 per cent over-capacity.

There are 15 roller bearings, 190 drop forgings, a double-heated carburetor. Each car is built slowly and carefully. There are grindings and re-grindings, countless tests and inspections. And test cars are still run for thousands of miles to show up any possible weakness.

Each is built to run for years and years as well as it runs when new. To eliminate troubles, to minimize cost of upkeep. Many thousands of users now can tell you what such precautions mean.

Now Beautiful

And now the car is as handsome as a car can be. With a beautiful streamline

body, deep upholstery, fine finish. With electric starter and electric lights of the best type made. With integral windshield, with all modern equipment.

And with our exclusive one-rod control. No levers in the way of the driver. Gears shifted as easily as moving the spark lever—by moving a rod three inches.

Men who buy their cars to keep want a car like this. They want this finality, this staunchness, this up-to-dateness. And they want, above all, an honest car, built in this careful, costly way. So many want it that our orders at times run five times our factory output.

We have dealers in a thousand towns. Name of nearest sent with catalog on request.

REO MOTOR CAR COMPANY, Lansing, Michigan

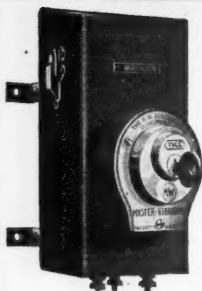
Canadian Factory, St. Catharines, Ont. Canadian Price, \$1,575

(230)

HIGH *and* LOW TENSION MAGNETOS



MASTER VIBRATORS ROAD SMOOTHERS AUTO LOCKS



Price
\$16.00
with Autolock
Pickproof Switch

TEN REASONS Why Every Third Ford is equipped with a



MASTER VIBRATOR



Price
\$15.00
with regular
Kick Switch

**Perfect Ignition, One Adjustment Instead of Four,
More Power, Uses Less Gasoline, A Hotter Spark, Easier Starting, A Smoother
Running Engine, Less Carbon Deposits, Cleaner Spark Plugs, No Worry.**

Only one adjustment. It takes the place of our separate vibrators in your coil, giving you one fast vibrator and a powerful condenser, which insures absolute synchronism. The K. W. Master Vibrator, while resembling an ordinary vibrator, is really a scientifically constructed magnetic circuit breaker which times the spark more accurately and gives better and surer ignition than a high tension magneto.

It can be put on in half an hour, no change in the car being necessary. Transportation is prepaid anywhere in the U. S. when cash accompanies order.

Write for descriptive folder today.

The K-W Autolock Switch can be installed on your Ford car in five minutes—absolutely prevents theft—and costs but \$3.50. Write for folder.

Get a



**Master
Vibrator**



The Standard of Excellence all over the world and have that Satisfied Feeling.

Don't Wait for Good Roads— Make Them By Using



Road Smoothers For Ford Cars

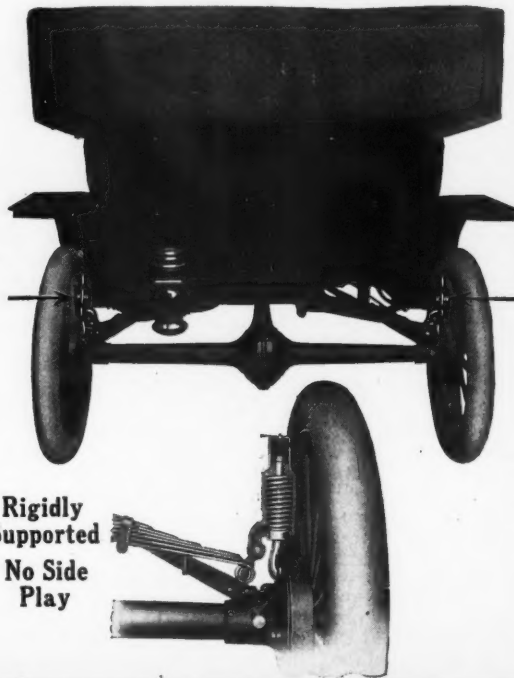
They work in harmony with the regular Ford Springs. They are shock preventers, not shock absorbers. Easy to apply—no holes to drill. Vanadium Springs.

K-W Road Smoothers add to your comfort, save your tires, and save the parts of your car from wear and tear. They are rigidly supported, which prevents your car from rocking from side to side, and materially reduces chances of skidding.

A Set of Four Costs but \$25

Right now when you are overhauling your old car or buying a new one is the time to put on K-W Road Smoothers.

Write for illustrated literature.

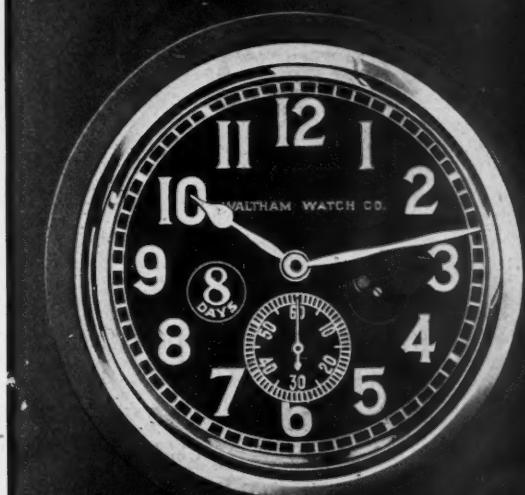


**Rigidly
Supported
No Side
Play**

HEADLIGHTING OUTFITS

2853 CHESTER AVE. **THE K-W IGNITION CO.** CLEVELAND, OHIO, U.S.A.

SPARK COILS SPARK PLUGS



Dial flush with dash



Model C

Winds without removing

Waltham Automobile Timepieces

Waltham Automobile Timepieces are the first which have ever been constructed specifically and exclusively for automobiles. They are not *adaptations*, but are scientifically designed and constructed for motor-car use.

This is indicated by the "C" model shown above. This model is sunk in the dash and the illustration to the left shows the dial flush with the dash. All attachments are concealed and the timepiece is an integral part of the finest car, harmonizing with it in elegance and simplicity.

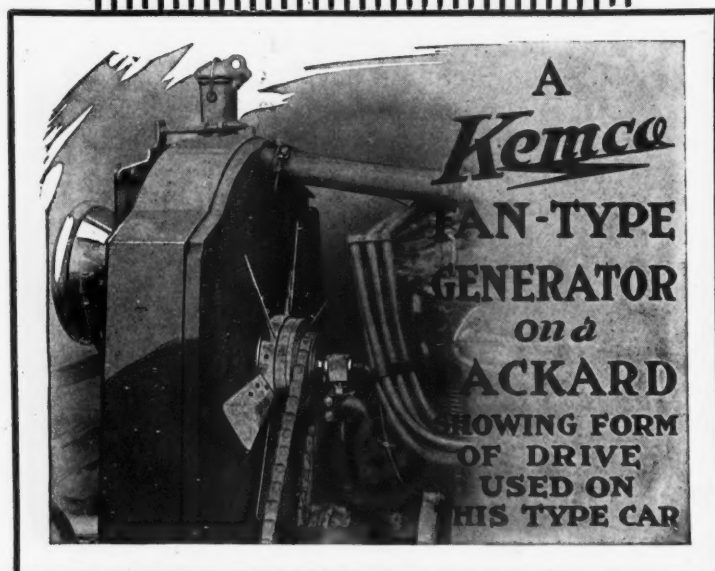
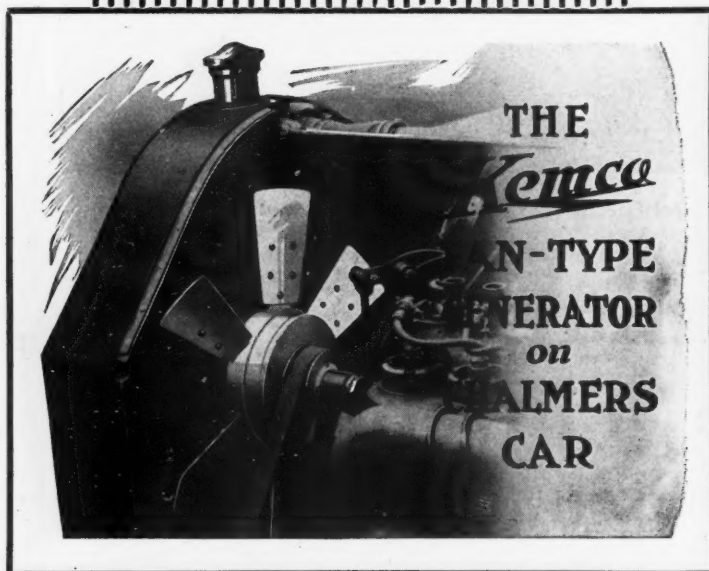
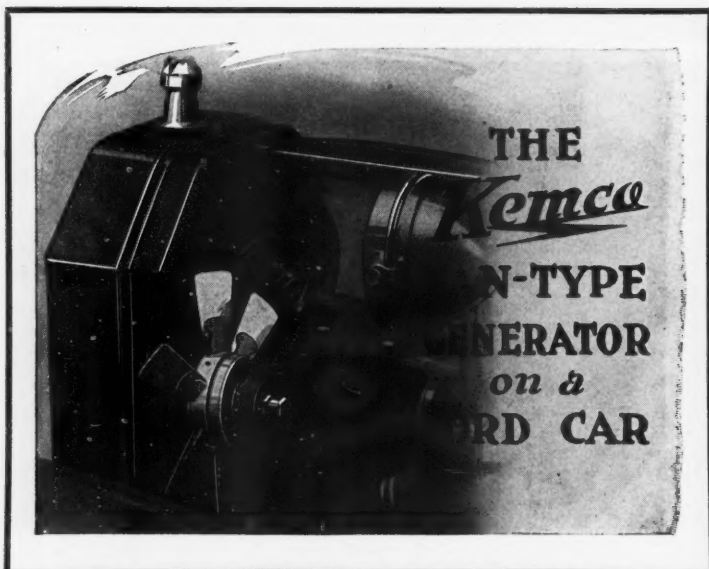
The illustration to the right shows the timepiece extended for winding. A turn of the wrist releases a spring which projects the timepiece from its niche in the dash, permitting the key to be raised for winding. After the key is

turned back, the timepiece is depressed to its former level, and locked in its normal position by another turn of the hand. The winding key also sets the timepiece, which is thus *never removed from the dash*. An indicator on the dial shows red when the timepiece needs winding, (once in 8 days).

All Waltham Automobile Timepieces are supremely accurate timekeepers. They are built to resist excessive vibrations and temperatures. Compared with them the usual "automobile clocks" of commerce are but so many "toys".

Motor-car owners, dealers, and manufacturers who want timepieces in conformity with high grade cars should profit by the unique merits of the Waltham.

Waltham Watch Company, Waltham, Mass.



Electric Lights for Every Car

A KEMCO Fan-Type Generator on your car gives you the safety, convenience and elegance of a high-priced car.

Your battery is kept fully charged because the KEMCO'S current output is large—you always have a dependable supply of current for lighting, starting, horn or ignition.

Kemco

Fan Type Generator

Easily Attached The KEMCO can be attached without tearing down your car. Merely remove your fan and replace with a KEMCO. No big bill for machining and extra parts. A wrench is the only tool you need.

Dealers:—Your Big Chance

800,000 car owners in this country want and ought to buy a KEMCO. 800,000 want a dependable electric system and have been demanding a generator that can be attached economically.

The KEMCO meets this demand.

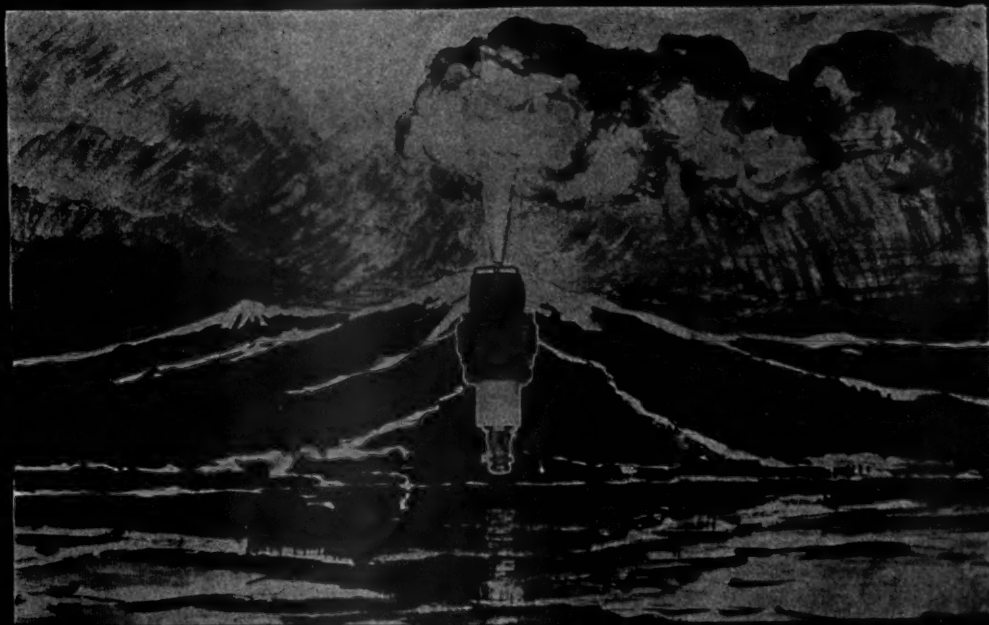
Proven conclusively by repeat orders. Territory is going fast. Are you going to let a chance like this pass by?

Get in touch with us today.

The Kemco Electric Mfg. Co.

2233 Ashland Road
Cleveland, Ohio

Mosler Vesuvius Plug



AS POWERFUL AND AS INDESTRUCTIBLE AS
THE FIRES OF VESUVIUS



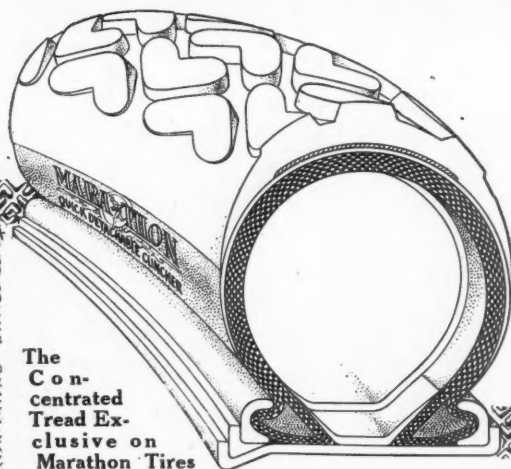
Insist upon the picture of the mountain both on the plug and on the box. It will guarantee you genuine plugs built under our Canfield Patent, which embodies a narrow, deep recess forming a chamber around the insulator, preventing short circuits by keeping all foul matter from the deepest parts of the insulation.



To ensure the entire benefit of the Canfield Patent the plug must be absolutely hermetically gas tight. If the insulator turns when the plug is being assembled this result cannot be accomplished satisfactorily. Note the tongued gasket which prevents the insulator from turning when the plug is assembled.

A. R. MOSLER & CO. NEW YORK.

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The
Con-
centrated
Tread Ex-
clusive on
Marathon Tires

The Men Back of Marathon Tires

A tire's ability to stand up depends much upon the men back of it—the men who build it.

Although Marathon is a new tire, it is built on the best of old principles—plus the latest ideas. It is built by men long schooled in the science—men who absolutely know.

Marathon Tire Specialists have developed many successful tires and the Marathon Tire is

Their Final Achievement

We picked these tire engineers because of their knowledge of the science of tire building, and their past achievements. In the Marathon factory they have no handicaps—they have no quality limit, save the best. We give them the finest materials and make utmost quality their goal. There's no rushing or slighting—we insist upon slow, careful work. The Factory Manager's standing order is "the best at any cost."

Winning Car Owners

This Tire of unlimited quality is fast winning car owners. Once a man buys Marathon, he becomes a constant Marathon user—and booster. No dealer finds it necessary to resell a motorist Marathon—the tires sell him, then.

In one short year the Marathon Tire has won its way onto the best cars and sold itself to men who want the most in tires.

Dealers consider if you should not sell this tire. Ask these distributors to show you a section of Marathon and tell you all the truths about it.

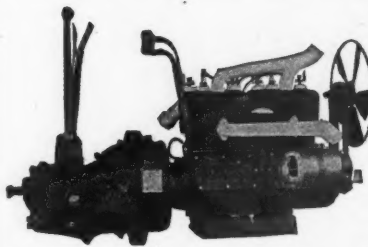
Manchester, N. H. J. B. McCrillis & Sons
Stamford, Conn. A. L. Schavior
Philadelphia, Pa. Geo. W. Nock Co.
Washington, D. C. Jones-Kessler Rubber Tire Co.
Pittsburgh, Pa. Marathon Tire Sales Co. of Pa.
Cleveland, O. Strong, Carlisle & Hammond Co.
Columbus, O. Columbus Automobile Supply Co.
Detroit, Mich. Superior Tire Repair Co.
Chicago, Ill. India Rubber Tire Co.
Buffalo, N. Y. The Clifford Co.
Rochester, N. Y. The Clifford Co.
Bridgeport, Conn. A. L. Schavoir
Hartford, Conn. Auto Tire Co.
New York City Marathon Tire Sales Co. of N. Y.
Des Moines, Iowa Des Moines Imperial Auto Co.
Fort Wayne, Ind. Brosius-Hocker Auto Co.
Bristol, Tenn. Davis Sparger Auto Co.
Youngstown, O. Consumers Auto Supply Co.
Toronto, St. Catharines, Hamilton, Ont.
Consumers Tire & Rubber Co., Ltd.
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The Marathon Tire & Rubber Co.
Cuyahoga Falls, Ohio (112)

MARATHON



Motors G-B & S Motors



We beg to announce our latest four cylinder Unit Power Plant.

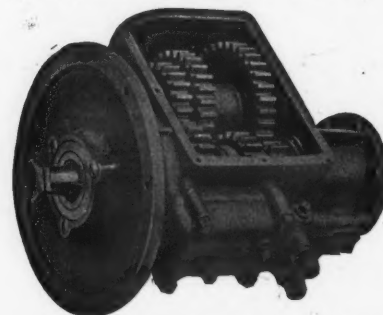
This Motor includes the recognized engineering practice, here and abroad. "Craftsmanship of long experience is the result of this distinctive Power Plant."

Detailed information on request, and we are in a position to make prompt deliveries according to contract.

GOLDEN, BELKNAP & SWARTZ CO.
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AUTOMOBILE PARTS



THE WARNER MANUFACTURING CO.
TOLEDO, OHIO

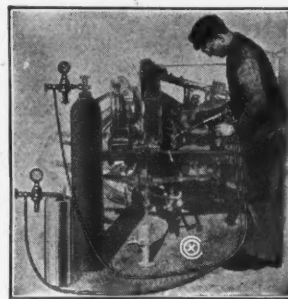
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Cox Combination Welding & Decarbonizer Outfit

Save time, money and make extra profit doing your own welding. Outfit complete and simple; repairs worn and broken parts good as new. Welds iron, steel, brass, bronze and aluminum. Safe and sure. Quick repair work. Includes oxygen carbon remover feature. Double work, double profits. Pays for itself in short time. Complete instructions furnished.

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3445 Michigan Ave. CHICAGO, ILL.
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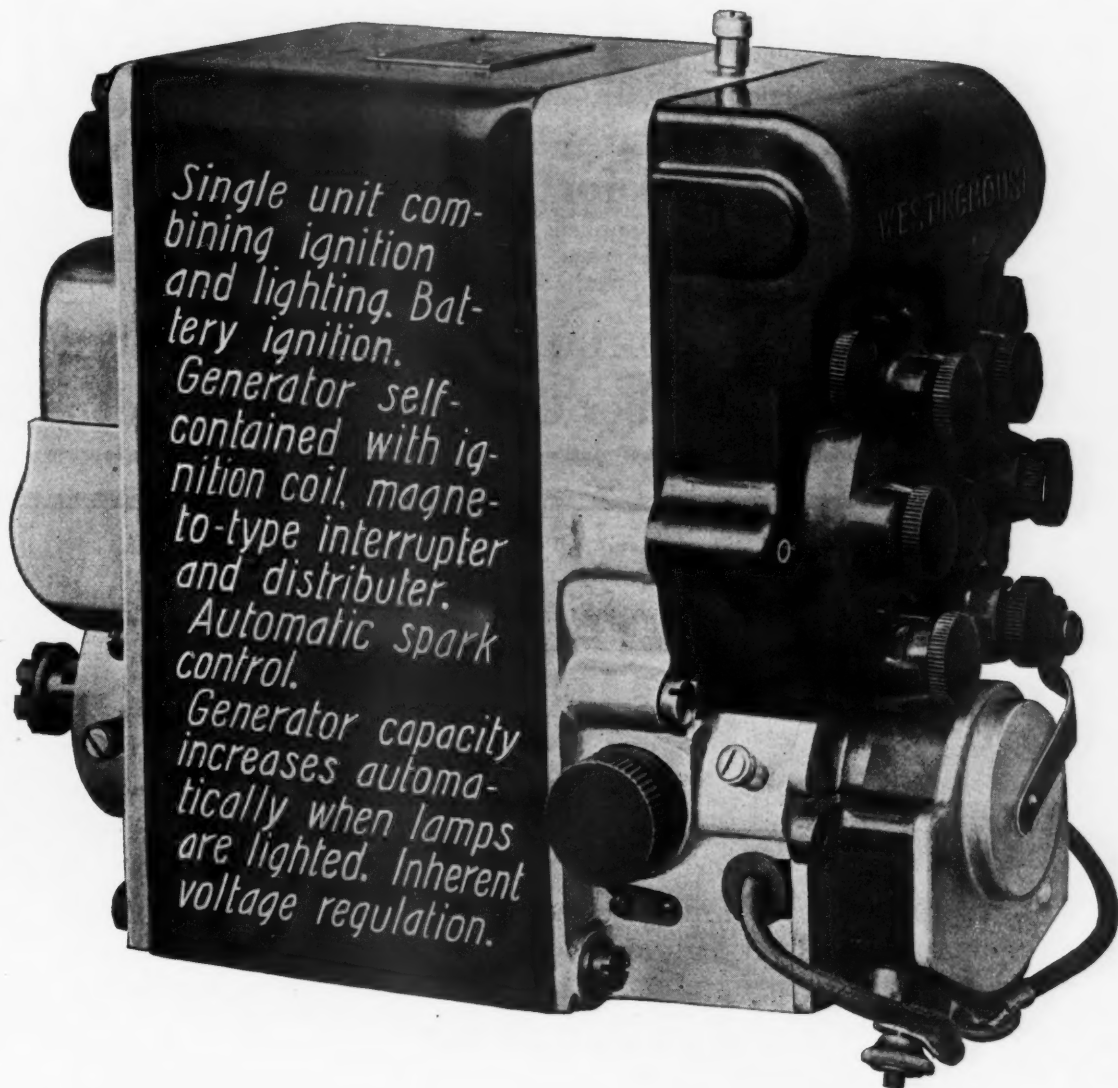
"Pass Them All"

KNOX
BEST BY TEST

Motor Cars

Send for Pleasure or Commercial Catalogue
KNOX AUTO CO., SPRINGFIELD, MASS.

Westinghouse Lighting and Ignition



To Dealers and Repair Shops

Send us your name and we will mail you a complete set of instruction books on Westinghouse Electric Starting, Lighting and Ignition Systems, and place your name on our mailing list to receive new instruction books as issued.

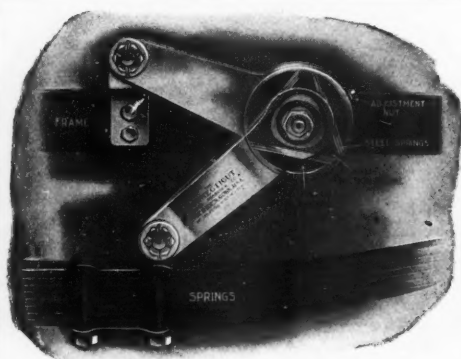
Westinghouse Electric & Manufacturing Co.

Automobile Equipment Division

East Pittsburgh, Pa.

Member Society for Electrical Development
"Do It Electrically"





CONNECTICUT

Shock Absorbers Prevent Spring Breakage

They adjust themselves automatically to road conditions and the varying weight of the load in the car. They save their cost over and over again each year in reduced tire bills and savings on springs.

Once installed on the car, no further adjustments are necessary. The jars and jounces which take the comfort out of riding are really absorbed by these efficient shock absorbers which make any car "a parlor car."

Price, Per Set of 4 Complete Installed on Car
Standard \$50—Light \$30.00

Special for Ford Cars

A special set of three shock absorbers supplied for Ford cars—exactly the same type as installed as factory equipment on the Pierce-Arrow, Haynes, Knox, Cunningham, Kissel Cars and many others.

These Ford Shock Absorbers are easily installed without special tools and their cost is very reasonable. Price \$22.50 per set.

WRITE FOR BULLETIN NO. 44

Connecticut Shock Absorber Company, Inc., Meriden, Conn.

Enduring Quality Proven

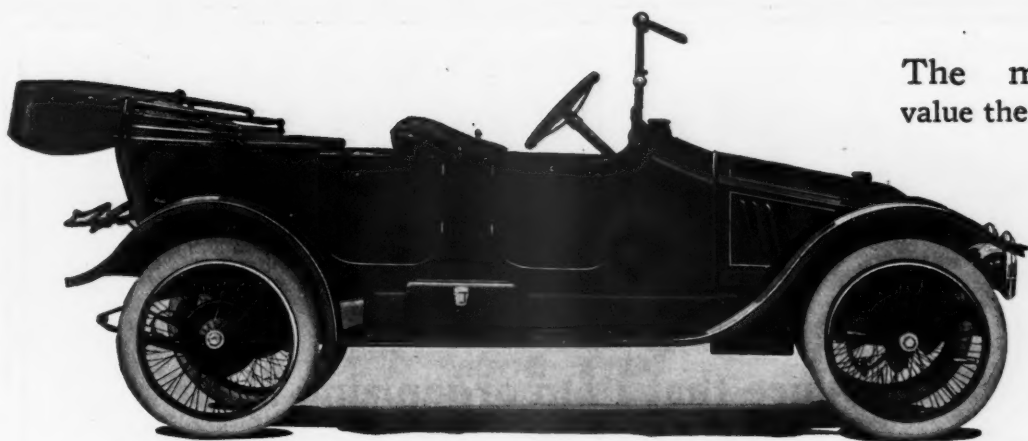
The persistent, constant and strenuous stresses of race track speed prove the superiority of New Departure Ball Bearings.

Thirty-nine winnings, twenty-six seconds, and eleven thirds, over a total of twenty-eight other motor cars, including foreign racing models, is the story of the New Departure equipped Mason Car the past season.

The American-made New Departure is guaranteed. Literature on request. Special Cyclecar data will be sent if you are interested.

The New Departure Mfg. Co., Bristol, Conn.

Western Branch
1016-17 FORD BLDG., DETROIT, MICH.



The most remarkable value the automobile industry has yet produced for striking beauty, mechanical merit, and every modern requirement, including wire wheels and electric starting and lighting for

Monarch—\$1,000

F. O. B. Detroit

A Big Five Passenger Touring Car Designed by Men Who Know

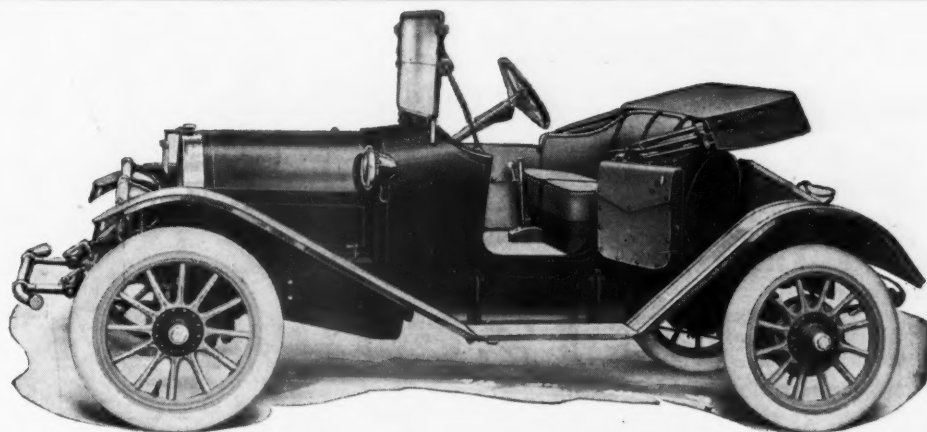
For the first time in motor history a low priced car has been produced which has remarkable beauty of appearance with every specification demanded by a motor public who appreciate the mechanical side as well as the accessory conveniences.

The Renault hood—used heretofore on higher priced cars—blends gracefully into a clean cut, streamline body of generous proportions. The usual unsightly radiator is concealed and protected under the front of the hood—an original position with the Monarch. This makes possible a new combination of body design which will be widely imitated.

The men behind the Monarch car know motor value. Through many years of gradual development they have watched and studied the possibilities of the thousand dollar car. The Monarch is their crowning achievement—the utmost they can offer. Write for complete information.

The Monarch Agency is valuable.

Monarch Motor Car Company
R. C. HUPP, President DETROIT



Seat Covers for
Overland 1913 Roadster
Retail Price \$15

Campbell Seat Covers Pay

They Pay You, Mr. Auto Owner

by adding wonderfully to the good looks of your car, by keeping the upholstery in such good condition that you can get \$100 to \$150 more for your car when you want to sell it. Your dealer can supply you, \$12 up.

They Pay You, Mr. Dealer

By giving you the best seat cover for the money and the fairest, most profitable agency proposition you have ever received. Write for information.

"CAMPBELL"
ACCESSORIES

Stock seat covers ready for immediate delivery on all models Ford, Buick, Cadillac, Hudson, Hupmobile, Maxwell, Overland, Reo, R. C. H., Pope Hartford, Studebaker. Covers for any car made on short notice. We also make an exceptional line of Ford accessories. Write for description and prices.

The Perkins Campbell Co., 622 Broadway, Cincinnati, Ohio

Announcement

I beg to announce that I am organizing a
Company to manufacture the new

Singer Car

Full details later.

Chas. A. Singer

— a Genuine

SHALER

SAFETY VUL-KIT

Vulcanizer

\$3.50

Saves Tires—Saves Repair Bills—Can Be Carried in Tool Box

At last—after months of experiments and tests we have finally perfected a Shaler Vulcanizer for repairing tubes and casings, that can be carried in the tool box and can be operated anywhere at any time. We now announce the "Shaler Safety Vul-Kit" at \$3.50—the lowest priced—really efficient Vulcanizer made today.

No Burning Flame—No Danger of Fire If Accidentally Upset

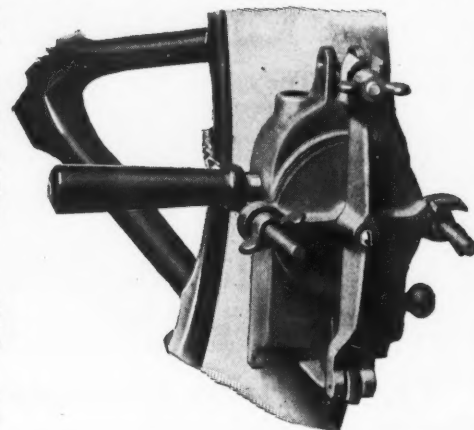
No watching, no regulating; simply fill the cut or puncture with new rubber, clamp on the Vulcanizer—fill and light the generator. The fuel supply is limited to that required for perfect vulcanization. No more—no less. You can't overcure or undercure.

Tubes are clamped against the vulcanizing surface by a swivelled plate inlaid with asbestos to retain the heat and prevent pinching the tube. You can't accidentally spoil a repair or tube by clamping one side of the plate tighter than the other. Handle, always cool, permits removing Vulcanizer from the tire as soon as repair is finished. Anybody can use it. Furnished complete with repair material—everything but the fuel. Fully nickeled—will last a lifetime.

FREE—Book on "Care and Repair of Tires"

Contains valuable tire information that every motorist should know and it explains all about tire troubles and their causes—how to care for tires—and hints on how to get more mileage. The leading American and Foreign Automobile Journals quote this book as an authority. We will send a copy free on request—together with full particulars about the Shaler Safety Vul-Kit at \$3.50.

The C. A. Shaler Company, 210 Fourth St., Waupun, Wis.
Canadian Distributors, John Millen & Son, Ltd., Toronto, Winnipeg, Montreal, Vancouver, Victoria



GABRIEL SNUBBERS

Now \$15, \$20, \$25, per Set of Four, two front and two rear. Half these prices per pair.

Here's a Good Tip!

The Fact that White, Peerless, Stearns, Oldsmobile and Lozier cars now carry Snubbers as standard factory equipment, and over Twenty other leaders as partial or special equipment.

Also the Fact that Snubbers are everywhere repaying their cost many times over on practically all sizes, types and makes of cars, suggests that you could do no better than look into the matter of putting Gabriel Snubbers on your own car RIGHT NOW.

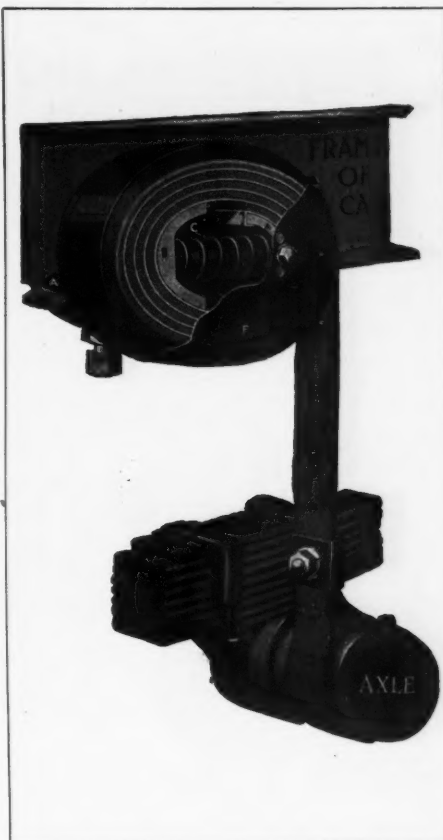
How About It? Tell us make and model of your car and we will quote price and show how easily you can put them on

Gabriel Horn Mfg. Co.

1415 E. 40th Street

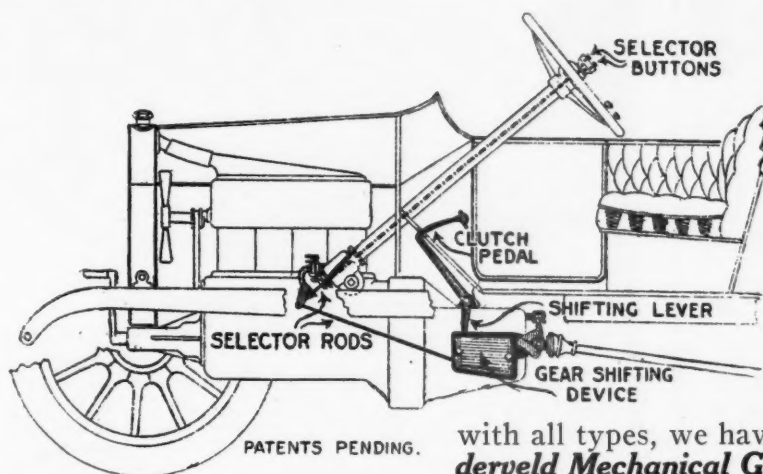
Cleveland, Ohio

We also manufacture GABRIEL Musical Horns and Windshield Cleaners



EQUIP FOR 1915

THE AUTOMOBILE USER WANTS A POSITIVE Mechanical Gear Shifter



with all types, we have proven the superiority of the **Vanderveld Mechanical Gear Shift** and offer it to the motoring public as the most positive, simple and easily operated device extant.

GET INFORMATION NOW

Engineering
Dept.

Grand Rapids Show Case Co. Grand Rapids,
Mich.

When Writing to Advertisers, Please Mention Motor Age.

Grinnell Gloves

Sold with a Bond

have all that beauty, all that quality, all that fine workmanship can bring to a glove, and three glove innovations besides—Rist-Fit Grip-Tite and Ventilated Back.

Rist-Fit gives Grinnell Gloves a snug fit at the wrist and prevents cuff from sagging down over the hand.

Grip-Tite, the corrugated double palm, gives the non-slip grip and sure control of the steering wheel—and double wear. Ventilated Back lets in cool air, yet keeps out dust. Grinnell Gloves are made of finest selected Reindeer and Coltskin—soft as velvet wear like iron. Washable in soap and water or gasoline—come out like new.

Style
V-4020

**Morrison-Ricker
Manufacturing Co.**
(Established 1856)
64 Broad St., Grinnell, Iowa



If your dealer doesn't carry them, send us his name and your size. We will send your selection on approval. Write for our illustrated glove booklet and samples of leather.

The AERMORE Exhaust Horn

Utilizes a Car's Waste Product

The AERMORE Horn attaches to the exhaust pipe. Opening the exhaust by means of a foot-pedal brings the horn into action.

The exhaust gases ordinarily wasted are thus made use of—at considerable saving to you. Because the AERMORE is dependent upon neither batteries, wires, "buzzers" nor ratchets, it is absolutely certain in operation, as well as without one penny of upkeep expense.

An AERMORE once attached means satisfactory signal service for the life of your car. You pay for an AERMORE but once. It has no after cost.



The AERMORE is self-cleaning, clog-proof. It is a chime horn, musical, yet with a voice of authority. It never insults. Has two tones, one low but clear, the other high and good for a mile.

Made of brass tubes, heavily nick-eled. No complicated parts. Very easy to install. Comes with all fittings ready to attach.

PRICES

No. 1—15" .. \$10.00
No. 2—12" .. \$9.00
No. 3—11" .. \$8.00
Ford Special .. \$5.50
No. 4—10" motorcycle. \$5.50

Write for literature.

THE FULTON COMPANY
MILWAUKEE, WISCONSIN



Why Argue?

Why argue the advantages of the LINCOLN HIGHWAY? Everybody believes in it. There probably isn't one man in a hundred thousand who doesn't believe the Lincoln Highway is a great thing.

Five dollars will place you among the immortals who build this road—will bring you a certificate of membership for your office and your family car—a badge of honor. The road may not run through your particular community. Yet you will have to admit that as laid out it is, everything considered, the most direct and sensible route that could have been selected. Do you know, for instance, that the road does not run through Detroit, though most of the officers and directors of the Association live in Detroit? For it is the aim to have the Lincoln Highway follow the most direct ocean-to-ocean route possible—and Detroit is off the route.

Thus, to enlist in this time of national need for good roads is to perform a patriotic service, to devote yourself to a cause that is going to do the greatest good for the greatest number, to do your share in building this wonderful road "of the people, by the people, and for the people."

Good wishes and conversation alone can't build the Lincoln Highway. It takes money and everybody ought to help to the extent of \$5 worth if not for more. Send that check today.

The pennant pictured herewith will decorate your car. It is sold for \$1.00 per pair (rights and lefts), and is in four colors and 36 inches long.

Send your contribution to

The Lincoln Highway Association, Detroit, Mich.

Space contributed by MOTOR AGE.

Copy contributed by H. W. Ford, President Saxon Motor Car Co.



MAYO SPARK PUMP

Adaptable to all size cars. Instantly attached by substituting for any spark plug. MAYO Quick Detachable Spark Plug may be used if desired. Pumps pure, fresh air only. Inflates largest tire in from 3 to 4 minutes. Built with metal rings like a motor and will last as long. Weight 2½ lbs. An occasional drop of oil the only attention it requires.

Price complete with pressure gauge, 12 ft. hose, all connections, \$10. Quick Detachable Spark Plug \$1.50 extra. Try One Free on Your Car for 30 Days. Write us.

MAYO MFG. CO.
55 E. 18th St., Chicago

\$10



**TOLMAN'S
WELDING OUTFIT**
A WONDER WORKER

Operating cost cut from 15 to 20%

Norfolk Oxy-Oil Decarbonizing Outfit \$35
Gets ALL the Carbon

No. 2 Welding Torch, with six tips \$35
Saves at least 15% over any other.

Complete Welding Outfit consists of the following:

- 1 No. 2 Welding Torch.
- 6 Tips, 3-4-5-6-7-8.
- 2 10-ft. lengths Hose.
- 4 Hose Connections.
- 1 No. 2 OB Regulator.
- 1 No. 2 AA Regulator.
- 2 Wrenches.
- 1 Bundle Steel Wire.
- 1 Bundle Cast Iron Rod.
- 1 Bundle Tobin Bronze.
- 1 Bundle Aluminum Rod.
- 1 Can Cast Iron Flux.
- 1 Can Tobin Bronze Flux.
- 1 Case.
- 1 Pair Goggles.

Complete Welding and Decarbonizing Outfit, \$100
Complete Welding Outfit, \$75

TOLMAN MFG. CO., 19-21 West 3rd Street BOSTON

Norfolk Decarbonizer, \$25.00

RED DEVIL

AUTO HORN

The RED DEVIL EXHAUST AUTO HORN clears the roads because it has a different sound—a pleasing, insistent note which literally grips a man by the collar and jerks him out of harm.

It is a signal that produces warning notes—not simply harsh noise. The warning is loud, forceful and melodious and puts pedestrians on their guard.

\$5.00, \$6.00

You can attach the RED DEVIL HORN to your exhaust pipe in less than five minutes. Will outlast your car.

See your nearest dealer—or write us. We'll send it prepaid upon receipt of price.

DEALERS! Write for our proposition today.

STANDARD MOTOR PARTS MFG. CO.
1200 Chestnut Street,
Philadelphia, Pa.

PAINTING OUTFIT
FOR FORD
AND SMALL CARS

Outfit complete, choice of six colors, \$5.75
With body and chassis in black, \$5.00

NORWESCO
(Formerly Called Pioneer)

Outfit contains one can each of the following:
Body Color Paint, Body Color Varnish, Black Pigment Varnish, Top and upholstery Dressing, Gloss-Black Brass Enamel, Gloss-Black Engine Enamel, Mahogany Varnish Stain, Three Brushes and four sheets of sand paper.

A thoroughly practical outfit that, with our complete directions will enable anybody to produce a perfect job.

Order through your dealer, he either has it or can get it.

THE Northwestern Chemical Co.
Marietta, Ohio.

Low grade fuel nor cold weather can prevent an immediate start if you have a

Duelec Vaporizing Primer

Fits all cars, operates from 4 dry cells, 6-8 or 12 volt battery and Ford magneto.

Our Offer

We will forward a Duelec for trial and comparison upon receipt of \$2.00.

It must meet most exacting requirements and convince you of its all around superiority, otherwise return and we will refund deposit. If after 10 days Duelec proves highly satisfactory, remit balance due, \$3. Make checks to order of U. S. Traub.

Attaches to any convenient location on intake manifold, in any position. Perpendicular, horizontal or inclined.

Delivers Hot Fuming Vaporized fuel to cylinders. The first spark explodes it.

No vexatious, tiresome, dangerous cranking.
No expensive spinning of motor by your self starter.
No risky mixtures required to promote a start.

DUELEC

Is not a raw gas primer, nor a hot air introducer. Its all around superiority we leave to the judgment of those who know. Circulars on request. With order state size of gasoline supply pipe and voltage of current.

DEALERS, write today. DUELEC is protected by patents allowed and pending.

DUELEC VAPORIZING PRIMER
YONKERS 14 North Broadway NEW YORK



They all see it now—what Henry Ford saw years ago—that the light, strong, quality car, sold at a low price, best meets the demands of all the people. Now they're all following where Henry Ford led.

Five hundred dollars is the price of the Ford runabout; the touring car is five fifty; the town car seven fifty—f. o. b. Detroit, complete with equipment. Get catalog and particulars from any branch agent, or from Ford Motor Co., Detroit, Mich.

Starts — Lights — Ignites

REMY

Six Volt System—Does-It-All

The Remy Starting—Lighting—Igniting Apparatus

Has been adopted by these exacting manufacturers, whose cars are listed below—BECAUSE Remy products have proven themselves 100% efficient:

Stutz	Premier	National
Reo	Studebaker	Mitchell-Lewis
Auburn	Marathon	Detroit
Empire	Zimmerman	

Remy country-wide system of service stations is a valuable sales asset to YOU.

**Modernize Your Old Cars—
Investigate Our Exchange Proposition**

REMY ELECTRIC COMPANY

Laboratories—Factories—General Offices
ANDERSON, INDIANA, U. S. A.



The Apple Electric Company
67 Canal Street Dayton, Ohio

America's Leading Manufacturer of

Electrical Equipment

for

Motor Cars

Motor Trucks

and

Motor Boats

Electric Engine Starters

Electric Lighting Outfits

(for Motor Cars)

Electric Engine Starters

Electric Lighting Outfits

(for Motor Boats)

**The Famous Apelco Storage Batteries
Electric House Lighting Plants**

WRITE FOR BULLETINS

The Apple Electric Company
67 Canal Street, Dayton, Ohio

Here is
the
Package
that
Will

Familiarize this package—accept nothing but the genuine if you want the best results. It contains 15 articles—sufficient material to make your Ford or any other car of similar size look spick and span.

COMPLETE OUTFIT, \$6.50
If your dealer can't supply you, just write us, we'll tell you who can.
Write for descriptive folder.

Make Your Ford Car Look Like New

Hanline Bros.
Paint Manufacturers
Baltimore, Md.



"I Want a Commission"

"Whenever I see a man tugging and straining with a hand pump, I step up and offer him the use of my Brown. The result is always the same. He wants to know where I got it and says he's going to get one right away. You ought to pay me a commission."

That's what one enthusiastic Brown owner writes. His experience can be multiplied by 50,000, for there are 100,000 Brown enthusiasts in the country.

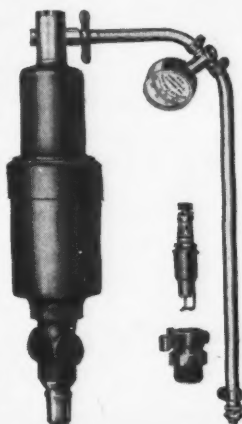
Join This Satisfied Army.

Remember the Brown Impulse Tire Pump is the only tire pump that includes spark plug, recording gauge and self opening valve connection as part of the regular equipment. The only one made of gray iron like your motor. The only one that can be attached and detached without a wrench.

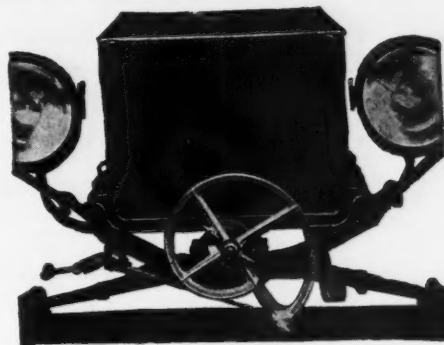
Price, complete with plug for\$15.00
Extra plugs 1.00
Previous models made over to fit the new connection 1.50

Your Dealer knows the Brown. Ask him.

THE BROWN CO.
120 Bellevue Ave., Syracuse, N.Y.



Now Comes the Improved **SANDBO** MECHANICAL STARTER



OPERATED BY DASH BOARD HANDLE

One pull turns your motor *completely* over. Spins your motor virtually as if it were cranked by hand—only you crank from the seat safely and conveniently. Light, quick, simple.

The SANDBO costs *little* at the outset. One broken arm from a "kick back" would cost you more than a SANDBO in doctor's bills. Then the SANDBO unlike gas and electric starters costs *nothing* to operate.

FORD OWNERS! Although the SANDBO may be used with any make car it is especially adapted to Fords. It is the logical starter for Ford cars because it carries no upkeep expense and will last as long as your car.

Write for Literature

Price Complete, \$20.00 At your dealer's or direct on receipt of price Dealers Wanted Everywhere Good Territory Open

THE SANDBO STARTER COMPANY
ROCK ISLAND ILLINOIS

Every Automobile and Garage Owner or Operator

should possess a reliable, durable, convenient Electrical Measuring Instrument



WESTON MODEL 280
Portable Testing Instrument

Weston Miniature Precision Ammeters and Voltmeters FIT THE POCKET

and are in every way the most accurate, durable, reliable and altogether satisfactory for testing batteries and electrical circuits

Send for 30-page bulletin No. 8 describing these and other small instruments.

Weston Electrical Instrument Co.
NEWARK, N. J.

New York Philadelphia Chicago Boston San Francisco St. Louis Denver Cleveland Detroit Birmingham Toronto London Paris Montreal Berlin

"WARNER GEARS—STANDARD FOR YEARS"

"It's an absolute impossibility to 'open up' a plant and immediately deliver efficient gear assemblies.

"It takes time and experience—especially experience—to enable a concern to ship really dependable parts.

"This is an undisputable fact, no matter what the business happens to be.

"We are surely capable, in lieu of these facts, as for thirteen years we have been manufacturing automobile gear parts for the most successful and best known motor car manufacturers in the country.

"And listen, what is more, we've been pleasing them in every particular.

"Is there any better proof of a product's merit than one hundred per cent of satisfied customers?

"Looks as if we ought to be able to please you too."

**WARNER
GEAR
CO.
MUNCIE-IND.**

DETROIT OFFICE—628 FORD B'L'D'G.

THE LAIDLAW CO., INC.
126-132 W. 46th St.
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BURBANK

MOTOR CLOTHS

See Our Announcement in This Publication
March 19th.

B. A. Gramm's Trucks

when it's a question of prompt and ever-ready service stand out prominently by themselves.

As an example, the electric starting outfit will save time and fuel, besides which there is the individual clutch transmission and many others.

Such features make it the choice of the discriminating user, and therefore the logical choice for the live agent.

Information regarding contracts and territory will be gladly furnished.

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Department 9

Lima, Ohio, U. S. A.



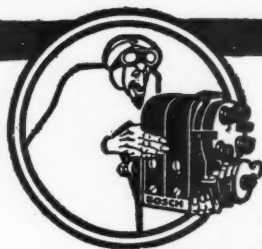
A box of assorted

RAJAH TERMINALS

for garages, in sizes and styles mostly used. Terminals exchanged if desired

RAJAH AUTO-SUPPLY CO.
Bloomfield, New Jersey

John Millen & Son, Limited,
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Every Car

that finished in the Vanderbilt Cup
and the Grand Prize Races was

Bosch-EQUIPT

Bosch Magnetos

Bosch Plugs

Be sure your car is Bosch-EQUIPT.

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—Perfectly easy, soft, luxurious riding over any road, at any speed, on **Detroit Springs**. Guaranteed two years. Write for book.

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You can
know these
springs by
this trade
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IGNITION DEVICES

High and low tension magnetos, make-and-break coils, dash coils, box coils, motorcycle coils, switches, spark plugs and other ignition specialties. Guaranteed satisfaction.

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KOKOMO ELECTRIC COMPANY, Kokomo, Ind.

Packard CABLE RESISTS HEAT

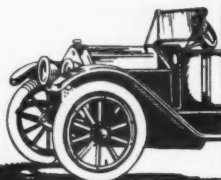
Heat takes the "life" out of rubber—cracks open—oil, grease and water gets in—no end of trouble results.

Packard cable is not affected by heat. The braids are impregnated with an enamel which protects the rubber from injury by heat.

Think this over and send for our new folder showing 16 samples, exact size and natural colors.

PACKARD ELECTRIC CO.
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(83)



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Universal Valves

For sale by Tire Mfrs., Jobbers and Dealers or
A. Schrader's Son, Inc.
782-791 Atlantic Ave., Brooklyn, New York

TRADE MARK REG. IN U.S. PAT. OFFICE




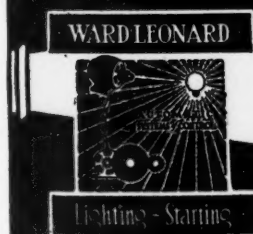
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TIRE PRESSURE GAUGE

MADE BY A. SCHRADER'S SON, INC., NEW YORK

Trade Mark
Reg. Apt. 80, 1896.

FINISHED CRANK SHAFTS**COMPLETE CONNECTING RODS****COLD DRAWN STEEL SHAFTING**Screw Stock, Flats, Squares,
Hexagons and Special Shapes**FINISHED MACHINE KEYS - MACHINE RACK**All material finished to a
superior degree of accuracy**STANDARD GAUGE STEEL CO.**

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**Cut Gears of Quality
Complete Differentials**

NEW PROCESS

GEAR CORPORATION
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SALISBURY**AXLES WHEELS
TRANSMISSIONS**

 Salisbury Wheel
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**WARD-LEONARD
SYSTEM****Faultless Lighting
Infallible Starting****WARD LEONARD ELECTRIC CO.**
BRONXVILLE, N.Y.**Acme Torsion Springs**

Could we make a stronger guarantee? And notice it is not a mere claim—it is a positive guarantee. WHY? Because ACME TORSION SPRINGS are based on SCIENTIFIC PRINCIPLES, properly applied. ACME TORSION SPRINGS, the only practical device on the market that can act FREE with, and CONTINUOUSLY IN CONJUNCTION with the LEAF SPRINGS, any way they are called upon to work, and adjust themselves MECHANICALLY to all conditions.

We Challenge Contradiction of Our Claims
 Get an Expert's Opinion

Equip your car with ACME TORSION SPRINGS
 Insurance for life of occupants, car and easy riding. Don't be fooled by "shock absorbers." What you want is more spring capacity under proper Automatic Control. Acme Torsion Springs add at least 18 feet to the total leaf spring area, every inch adding greater resiliency automatically controlled.

Acme Torsion Springs stop vibration, prevent spring crystallization and breakage, minimize tire and engine trouble, and improve the riding qualities of any car at least 100%. They cost less than half the price of shock absorbers, and are worth several times as much. Eliminate Vibration and you eliminate trouble. We have convinced thousands, let us convince you.

N. B.—Acme Torsion Spring Equipment is fully Guaranteed against Defects and Breakage for the life of the car.

Write today for information.

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Acme Torsion Springs are covered by letters of patent, and we have the sole and exclusive right to manufacture, use and sell the same. Take warning that our interests will be protected.

STANDARD FOR 59 YEARS**1855****1914****Jones Wheels****"Best on Earth"***A broad statement, but we stand by it.*

THE NAME OF JONES
 AS APPLIED TO
 WHEELS MEANS THE—

**First—Last and
 All-the-Time Word
 In Wheels**

"Kantsamore"

Buyers of Vehicles should say—
 "Give me wheels made by

Phineas Jones & Company
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Gas Saving and Back Fire Preventer

More power and less wear on the motor by vaporizing every atom of gasoline, thus attaining better lubrication.

Prevents Back Firing and Makes Starting Easy

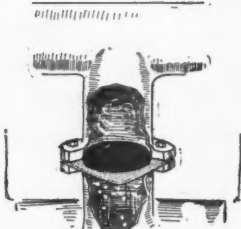
ECONOMIZES FUEL by going 50% further on a given amount of gas.

THE GAS SAVING AND BACK-FIRE PREVENTER is placed between the intake manifold and the carburetor. It's a device that is 100% perfect and saves its cost many times over in a season.

Price \$3.00

Sent prepaid upon receipt of price.

GAS SAVING AND BACK FIRE PREVENTER COMPANY
125 E. 23rd Street, New York City



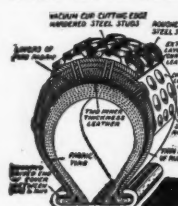
Bricton Pneumatic Tires

At last the pneumatic tire problem has been virtually solved—the weak points in previous tire construction have been eliminated. The resiliency of a Bricton Pneumatic Tire puts it in a class by itself. It is Puncture-proof—Blowout-proof—Skid-proof—Rut-proof—Rim-out-proof—Oil-proof and Gasoline-proof.

Ten Days' Free Trial

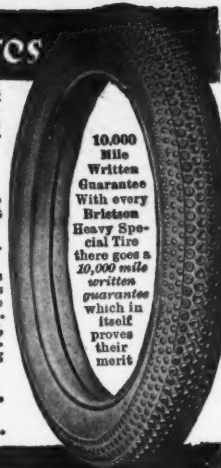
To remove all doubt that might arise in the purchaser's mind and to back up our statements—we will allow 10 days' free trial on the first set that goes into each town.

Your Tires Can Be Made Like This



If you are not in need of new tires and the fabric in your present tires is still good—we can rebuild them the Bricton Way—making them Puncture-Proof, Non-Skidding, Blowout-Proof, Rut-Proof, Oil-Proof and Rim-Out-Proof. Write today for full particulars, giving your dealer's name.

THE BRICTON MFG. CO.
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Brookings, So. Dak., U. S. A.



Braender Tires & Tubes

SERVICE and SATISFACTION

The Only set of Tires to complete the entire 500-mile race at Indianapolis, May 30, 1913. Consider that 88 Tires of other makes were changed in this Race. Our "Victory Folder" explains other races.

Braender Rubber & Tire Co.

Main Office & Factory **Rutherford, N. J.**
New York, 1987 B'way. Chicago, The Alfredal Co. Boston, Dayton Tire Co. Pittsburg, Keystone Motor Supply Co. Indianapolis, Brant Bros. Columbus, O., Franklin Rubber Co. Troy, N. Y., G. H. Snyder. Newark, N. J., Ketcham & Lawrie.



Established Agents
Solicited

Why should the auto business be different from any other business? To my mind it is not, and the sooner it gets down to a horse sense basis the healthier it will be. The day when it was a "game" is gone. The red fire and hurrah period is past. And the companies which stay in are the ones which are going to adopt a hard-headed, close-margined, business-like policy.

E. W. Austin

President of The Lexington-Howard Co.
Manufacturers of Lexington "Four," \$1335, and the Howard "Six," \$2375, Connersville, Indiana.

KISSELKAR TRUCKS

Complete Line of Commercial Vehicles

All type bodies—special bodies designed. Unexcelled for service, efficiency and economy. KisselKar Trucks have great reserve power. Low fuel cost; sizes to give more economical service under all conditions.

1500 lbs. 1, 1½, 2½, 3½ and 6 Tons

KisselKar Service Buildings at principal points throughout the U. S. are equipped to give an unusual service to owners of KisselKar Trucks. Let us analyze your haulage problem and show you how to make a big saving.

Write for Catalog—Over 200 Styles

Kissel Motor Car Co., 121 Kissel Ave., Hartford, Wis.

The Atwater Kent Ignition System



For every kind and make of motor. A system ideal in efficiency, simplicity, and reliability.

Write today for booklet A.

ATWATER KENT MFG. WORKS

4934 Stenton Ave., Philadelphia.

74-N

"Bridgeport"

TRADE MARK

BRASS CO. U.S.A.

TIRE PUMPS

Are easy to use and easy to sell. They are durable and efficient—and are widely advertised. The cylinders are of seamless brass tubing which cannot rust. The "Stapley," the "Aeolus," "Windjammer," etc., give lasting satisfaction. Carry them in stock.

Bridgeport Brass Company
P. O. Box A Bridgeport, Conn.

Hyatt Roller Bearings

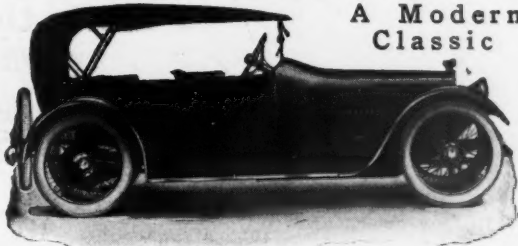


Lead the world in quantity of production. Twelve mammoth factory buildings required to supply the demand.

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HYATT ROLLER BEARING CO.
Detroit, Michigan

PULLMAN MODEL 6-46AA Modern
Classic

Price \$2500 *Including Vulcan Electric Gear Shift*
FOURS & SIXES..\$1800 to \$3000
 Pullman Motor Car Co., York, Pa., U.S.A.

THE RUTENBER MOTOR

MANUFACTURED SINCE 1901 FOR HIGH GRADE
AUTOMOBILES AND TRUCKS

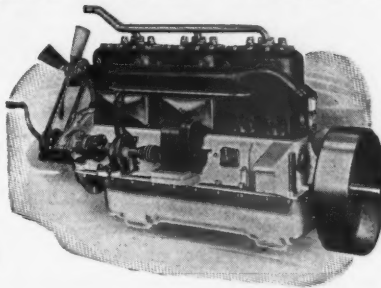
8 x 5 1/2 four and six cyl.
 4 1/2 x 5 1/2 four cylinder
 4 x 5 1/2 four cylinder

Standard or Unit
 and

4 x 4, 4 cyl. standard type,
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Manufacturers are in-
 vited to investigate our
 service and our facilities.
 Literature on request.

**The Rutenber
 Motor Company**
 Marion, Indiana

**FORD SPECIAL C-Well Rear Sight Auto Mirror**

Fits Any Ford Wind Shield
 Every Ford Owner Should Have One

\$2.00
 Black
 Enamel
 \$3.00
 All
 Nickel

"Safety
 First"



Eliminates all chance of accidents from rear end collisions, backing down embankments, etc. Pays for itself every day in the year. Made in 6" circle, finished in black enamel or nickel. The all nickel is built specially for Ford Cars. Money back if not satisfied. Agents wanted.

The Standard Spinning & Stamping Co., Toledo, O.

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Model "36" \$1275.00

A car whose design and construction is so far ahead of others at its price that it is in a class all its own.

Gray and Davis Electric starting and lighting equipment, silent chain cam shaft drive, four inch by five inch motor, cork insert multiple disc clutch, 116 inch wheel base, left side drive, center control, and equipment complete to the last detail.

Model "25" \$975.00

Including Electric Starting and Lighting System

This model has made the Paige reputation. Such a sturdy, powerful, comfortable car has never been offered the public at anywhere near its price. \$975.00 with complete equipment.

Splendid Agency Proposition

Paige-Detroit Motor Car Co., 304 Twenty-First St., Detroit, Mich.

The Searchlight Gas Co.

1016 Karpen Building

CHICAGO, ILLINOIS

Stronger than ever, legally, financially and in the esteem of the trade. Watch us grow.

BRANCHES AND REFILLING STATIONS:

Warren, Ohio	San Francisco, Calif.	Los Angeles, Calif.
Chicago, Ill.	Buffalo, N. Y.	New York City
Detroit, Mich.	Atlanta, Ga.	Syracuse, N. Y.
Camden, N. J.	Dallas, Tex.	Minneapolis, Minn.
Philadelphia, Pa.	San Antonio, Tex.	Toronto, Canada
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WANTED: Good Representatives. The agency for JESCO electric starting-lighting equipment is a big asset to an electrical or accessory concern. With the JESCO you can secure a good business in making installations on cars in use. Some territory is still open. Let us outline our installation and service agency proposition.



Write for full particulars.

**Jones Electric
 Starter Company**

Jackson Blvd. and Loomis St., Chicago, Ill.

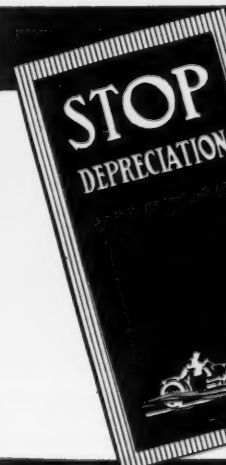
UNIVERSAL JOINTS
"SPICER" MEANS QUALITY

"SPICER" on universal joints means quality, and "SPICER" quality has been a standard ever since universal joints have been manufactured.

Let us quote you prices on your requirements.

SPICER MFG. CO., Plainfield, N. J.

Domestic Representatives: K. Franklin Peterson, 122 So. Michigan Blvd., Chicago. Thos. J. Wetzel, 17 West 42nd St., New York. L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit. Foreign Representative: Benjamin Whitaker, 21 State St., New York.

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This booklet contains some very interesting information regarding results in stopping car depreciation which have been accomplished by the use of

Whitmore's Auto Gear Protective Compositions

It gives full particulars regarding Whitmore's "Perpetual Lubrication" the new lubricating system which is greatly increasing metal life. Write for copy today.

In ordering Whitmore's Compositions be sure to state definitely for what part of car lubricant is wanted.

THE WHITMORE MFG. CO.

Lubricating Engineers

33 Iron Court,
 Cleveland, O., U.S.A.



Skid Blowouts

Rimcuts Punctures Wearing Off of Rubber NIT

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout.

Special Prices to the First in New Territory

KIMBALL TIRE CASE CO., 173 BDW., COUNCIL BLUFFS, IA.

DON'T THROW AWAY YOUR OLD TIRES COVER THEM WITH STEEL AND USE THEM FOREVER

KIMBALL TIRE CASE CO.



Electricity Shifts the Gears on the

HAYNES

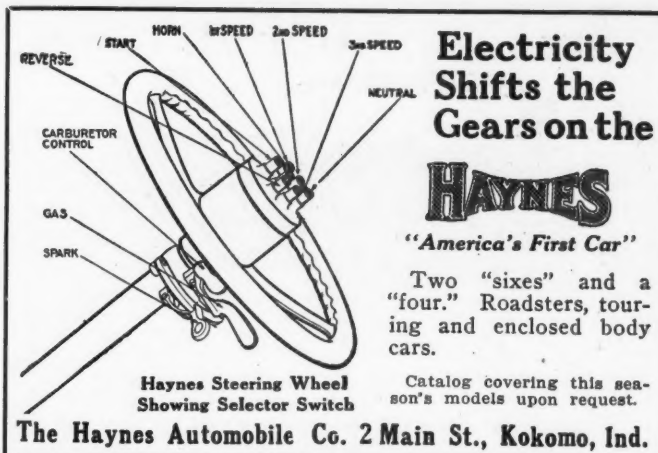
"America's First Car"

Two "sixes" and a "four." Roadsters, touring and enclosed body cars.

Catalog covering this season's models upon request.

Haynes Steering Wheel Showing Selector Switch

The Haynes Automobile Co. 2 Main St., Kokomo, Ind.



PREMIER

AMERICA'S GREATEST TOURING CAR

PREMIER MOTOR MFG. CO. INDIANAPOLIS, INDIANA



THE STAR

COMPLETE THRUST BEARING

The Star Ball Retainer Co. Lancaster, Pa., U. S. A.

RADIAL RETAINERS

Manufacturers of Radial Ball Retainers, Thrust Ball Retainers, Complete Thrust Bearings



THE CROWE MASTER VIBRATOR A BOON TO FORD OWNERS

Ends all vibrator troubles permanently. Produces a quick, hot spark, always uniform—no missing or late sparks. Takes the "jump" and "jerk" out of your machine; increases its power; economizes fuel; makes your engine start easier, pull steadier, run smoother, develop more power.

You can go slower on high gear without danger of killing your engine.

The Crowe is the simplest vibrator made: only 2 1/2 inches in diameter—neat in appearance; easily installed—no need of an unsightly box on your dash.

This vibrator is so different and so much better in its construction and in the work it will do than any other vibrator, that Ford owners will be surprised when they investigate.

PRICE ONLY \$10.50. Sold by garages or accessory dealers everywhere, or sent direct on receipt of price—under our positive guarantee of perfect satisfaction or all money refunded—after 30 days' trial. Dealers will find the Crowe a good seller in a big field, at a good profit. All Crowe users are satisfied and enthusiastic customers. See your dealer or write us direct.

LISLE MANUFACTURING CO 100 Main St., Clarinda, Iowa

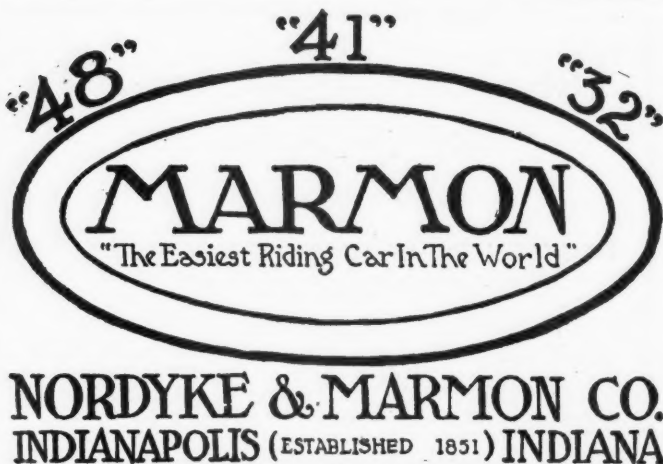


"48" "41" "32"

MARMON

"The Easiest Riding Car In The World"

NORDYKE & MARMON CO. INDIANAPOLIS (ESTABLISHED 1851) INDIANA



Get This

problem of lubrication settled once and for all. You are paying dearly and taking a big risk when you use a cheap oil or grease for the delicate mechanism of your car. You should use

NON-FLUID OIL

A trifle higher in price and much higher in lubricating properties than ordinary grease or oil. NON-FLUID OIL will not thin out and run in warm weather nor become thick and gummy in cold weather. NON-FLUID OIL is a perfect lubricant.

New York & New Jersey Lubricant Co.

165 Broadway, New York 1430 Michigan Ave., Chicago



ANNOUNCEMENT!

Rudge-Whitworth Detachable Wire Wheels

will hereafter be made for the George W. Houk Company by the Houk Manufacturing Company of Buffalo, New York—delivery to commence March 15th.

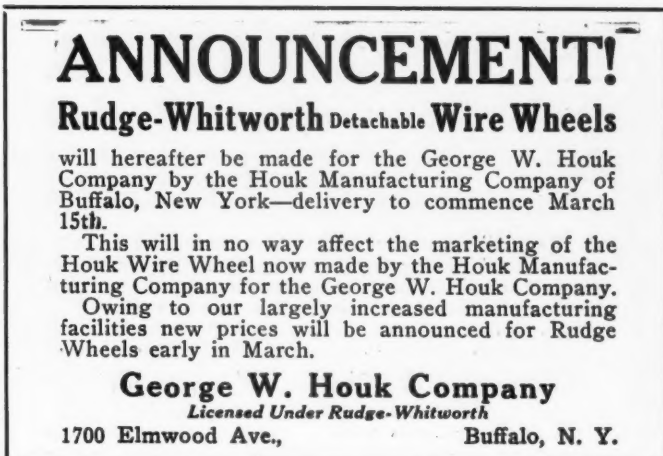
This will in no way affect the marketing of the Houk Wire Wheel now made by the Houk Manufacturing Company for the George W. Houk Company.

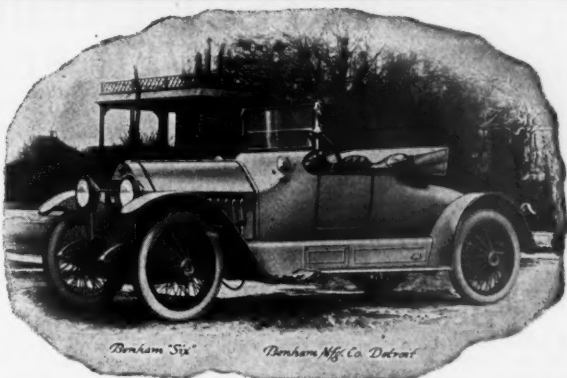
Owing to our largely increased manufacturing facilities new prices will be announced for Rudge Wheels early in March.

George W. Houk Company

Licensed Under Rudge-Whitworth

1700 Elmwood Ave., Buffalo, N. Y.





Benham Mfg. Co., Detroit, Mich.

Firestone

Removable Rim Equipment For Truck Tire Service

Owes its unquestioned leadership to two things—ease of operation and scientific construction. Write for the catalog of "Common Sense Principles."

THE FIRESTONE TIRE AND RUBBER COMPANY
Akron, Ohio Branches Everywhere

METZ "Twenty-Two" Roadster



THE GEARLESS CAR
"No clutch to slip—no gears to strip."

\$475

1914
Improvements

Completely Equipped

Center control, left-hand drive, 4-cylinder 22½ H. P. water cooled motor, Bosch magneto, standard artillery wheels, best quality clincher tires, extension top, windshield, five lamps, gas generator, tools, etc. Makes 5 to 60 miles per hour on the high speed, 28 to 32 miles on 1 gallon of gasoline, and is a wonderful hill climber. A strong, reliable, stylish, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory. Write at once for Book "K" and particulars.

METZ COMPANY

WALTHAM, MASS., U. S. A.

HERZ PLUG

"BOUGIE MERCEDES"

BLUE STONE & STEEL

Guaranteed One Year
Your Dealer or HERZ & CO. New York

Continental Motors

4 and 6 Cylinder Types

Not made to meet a price, nor to shatter records of quantity, but to fulfill a service ideal—to be a true foundation for a worthy motor vehicle.

Continental Motor Mfg. Co.
Detroit, Mich.

Factory Representative, K. F. Peterson, 122 S. Mich. Ave., Chicago

HENDERSON

KEROSENE BURNING CARS

Twenty miles per gallon on kerosene or gasoline, as proven by cross-continent trip, a trip around the world and by cars in the hands of hundreds of satisfied owners—four and six-cylinder models.

Write for "Kerosene Facts"

Henderson Motor Car Company
Indianapolis

Standardized Transmissions

Covert Motor Vehicle Co. Sales Office Detroit
Factory Lockport N.Y.

Springs of Cross-Rolled Steel Cut Upkeep

In this new process, the steel is worked both *longitudinally* and *transversely*. So we get superior strength and toughness. This process is used exclusively in our Chrome-Vanadium Brand of Springs.

Find out more about them. It will make a tremendous difference in the riding qualities of your car. Let us send you full particulars.

Best Grade—Chrome-Vanadium
Next Best—Special Analysis

The Cleveland-Canton Spring Co., Canton, Ohio, U.S.A.

WINTON SIX

Find Out About the Maker

Find out where the maker stands before you buy. Know that the Winton Company has always followed sound and enduring policies. No water in its stock, no bonds, notes, or mortgages to be charged for in its price, no frantic and frequent changes in models that prematurely age and depreciate prior models, no juggling with quality, no marketing of experiments, no grasping after quantity, no exaggerated price. Fully equipped with the best of everything, \$3250. Ask for catalog.

THE WINTON MOTOR CAR COMPANY
424 Berea Road, Cleveland, O.

World's First Maker of Sixes Exclusively

\$2400

Completely Equipped

MOLINE

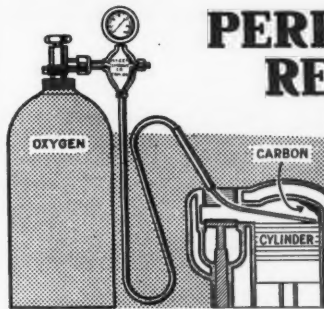
More Power
More Flexibility
More Economy
More Silence

KNIGHT

Four-cylinder,
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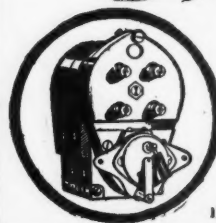
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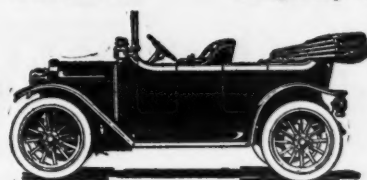


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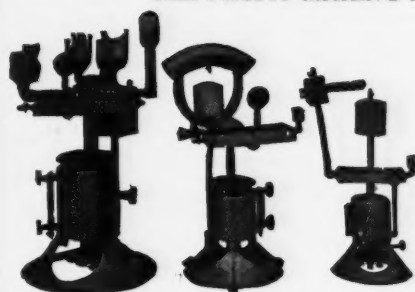
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1332 Michigan Ave., Chicago, Ill.

GET WHAT YOU PAY FOR

Our Hydrometer tells you exactly what grade gasoline you are getting. Sent prepaid, complete with glass jar and case for One Dollar. 25,000 sold this year. Send for yours today.

MARSHALL, WALTER & CO.,
Milwaukee, Wisconsin.

GET OUR PLAN FOR MONOGRAMMING automobiles and motorcycles by special transfer method. **MOTORISTS' ACCESSORIES CO.,** Ashland, Ohio.

GRIND YOUR OWN CYLINDERS IN YOUR own shop. Save Money. Make Money. Perfect Work. Lowest Cost. No rotating of cylinders required on the Acme Grinder. Particulars on request.

ACME GRINDER COMPANY,
2740 Humboldt Ave., So. Minneapolis, Minn.

LEVENE MOTOR CO.,
Sole manufacturers and distributors of repair parts for
LION MOTOR PARTS CO.
LOUIS J. BERGDOLL MOTOR CO.
MIDLAND MOTOR CO.

We have purchased the entire stock of parts, jigs, patterns, drawings, etc., of the above mentioned companies, and are prepared to fill orders for repair parts for all models of these cars; give name and number of cars when ordering parts. Price list on application.

LEVENE MOTOR CO.
2200-2218 Diamond St., Philadelphia, Pa.

MAGNETOS EXCHANGED,

BOUGHT AND SOLD.

We repair any make of magnetos and coils.
FORD MAGNETO CO.,
2610 Locust St., St. Louis, Mo.
Telephone Bomont 65; Central 9570L.

MAGNETOS: WE HAVE 2,000 MODEL X Splitdorf Magnetos, new Price, without coil, \$17.50 each; with coil, \$25.00 each. The regular price of these is \$75.00.

We also have other makes of magnetos at cut prices—in fact, everything for the automobile. Send for "OUR PRICE WRECKER"—the greatest money saver in the world.

TIMES SQUARE AUTO CO.,
1210 Michigan Blvd., Chicago, Ill.
S. W. cor. 56th St. & Broadway, N. Y. City.

MICHIGAN, MORA AND DRAGON PARTS.

We have maintained the exclusive repair parts business of the Dragon Car since 1907 and on the Mora Car since 1910. We recently purchased the bulk of the stock and all repair parts of the Michigan Cars necessary to maintain the best service in this car also.

This stock together with our unexcelled machine shop equipment should afford Michigan car owners better service than the makers of the car could give. Our revised price list is now ready for distribution, same will be furnished on application, giving model, style and year of car.

PHILADELPHIA MACHINE WORKS,

61-71 Laurel Street, Philadelphia, Pa.

MOTOR OWNERS ATTENTION.

National Oxygen Carbon Remover. Fully Guaranteed, \$10.00. Don't buy unnecessary attachments, we will let you try this machine thirty days. National Sales Company, 210 Midland Building, Kansas City, Mo.

MOTORS, TRANSMISSIONS, WHEELS, axles, coils and magnetos, also other parts, will exchange for almost anything; what have you? Address Box 22, Moberly, Mo.

PEERLESS EXTRA FINE BLACK JAPAN.

The finest air drying black enamel for all around work on automobiles. Use on all kinds of metal or wood. Dries with a gloss finish. Ask your dealer.

THE COLUMBUS VARNISH CO.,
Columbus, Ohio.

NEW FORD TOURING CAR BODY WITH top and side curtains complete, painted and upholstered, crated, f. o. b. Toledo, \$68.00. MacInnis Bros., Toledo, Ohio.

NEW FOUR CYLINDER AUTOMOBILE and 2 cylinder stationary engines. We solicit all kinds of machine work and guarantee satisfaction.

ALFORD MOTOR & MACHINE CO.,
Goshen, Ind.

PEERLESS EXTRA FINE BLACK BAKING JAPAN.

Bakes to either a high gloss, egg-shell gloss or dull finish on all metal parts of automobiles. One coat covers solid. Ask your dealer.

THE COLUMBUS VARNISH CO.,
Columbus, Ohio.

NO-LEAK PUNCTURE SEALING COM-

pound. Will not injure tires.
32x3 1/2, 50 cts.
35x4 1/2, 75 cts.
Motor cycle, 25 cts.

Stamps taken. Postpaid. Special half price.
CHICAGO TIRE SPECIALTY WORKS,
547 Englewood Ave., Chicago.

ONE 6 H. P. KEWANEE UPRIGHT BOILER complete with gauges, pop valves and injector, \$60.00.

One 2 H. P. boiler complete with gauges, pop valve, etc., \$40.00.
One set sectional vulcanizing auto tire moulds with straight side quick detachable and Fisk Bead moulds for three inches to five inches, inclusive, fitted for gas or steam, \$50.00.

AKRON TIRE & VULCANIZING CO.,
932 Jackson Boulevard, Chicago, Ill.

OXY-ACETYLENE WELDING PLANT DE- signs. Blue prints for building & operating complete apparatus at low cost in your shop. P. O. Box 77, "Draftsman," Ft. Ward, Wash.

PEERLESS CYLINDER ENAMEL.

Will finish the metal parts a smooth black finish which will not be affected by heat, grease or gasoline. Ask your dealer.

THE COLUMBUS VARNISH CO.,
Columbus, Ohio.

PAINT YOUR CAR YOURSELF

Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

ARSENAL VARNISH COMPANY,
Auto Dept., Rock Island, Ill.

PEERLESS JET BLACK FENDER JAPAN.

A rich black enamel to finish fenders of automobiles. One coat covers solid. Air drying in thirty-six hours. Ask your dealer.

THE COLUMBUS VARNISH CO.,
Columbus, Ohio.

PUMP HOSE, BEST GRADE. JOB LOT OF short lengths, 2c per ft. Brake band lining, all sizes and thicknesses, radiator hose, two and three ply. Short lengths at half regular dealers' prices. Pennant holders, 10c each. Write for list, save 50% on the above accessories.

AUTOMOBILE SUPPLY CO.,
Burlington, Wisconsin.

RADIATORS.

NEW.	NEW.
Ford T	\$17.00
Buick F, 16, 17, 19, 26, 27, 28.....	30.00
Buick 10, 14, 32, 33.....	22.00
Hudson 20	28.00
Hupp 1910-1911	27.00
Overland	30.00

All other makes at equally low prices. Send us your old radiator for repairs or exchange on a new one.

TIMES SQUARE AUTO CO.,

1210 Michigan Ave., Chicago, Ill.
56th & Broadway, New York City.

PEERLESS AUTO BODY POLISH.

Brightens and renews the finish on all varnished surfaces of automobiles. A varnish food and life restorer. Ask your dealer.

THE COLUMBUS VARNISH CO.,
Columbus, Ohio.

RADIATORS.

"Put up a good front" by putting on our genuine guaranteed cellular radiators (commonly called Honeycomb).

Ford T. \$25.00
Buick 10-24-25-34-35-36. 27.50
Buick 16-17-19-26-27-28. 35.00
Buick 21-38-39-43. 37.50
Equally attractive price on all popular models. Every one a new, complete radiator. Five per cent discount allowed for cash with order.

DETROIT RADIATOR & SPECIALTY CO.,

963 Woodward Ave., Detroit, Mich.

RADIATOR COVERS FOR ALL CARS.

Every car should have a radiator cover in cold weather.

Write for prices.
Auto Cape Top Co.,
2334 Michigan Ave., Chicago, Ill.

RADIATORS THAT COOL THE MOTOR and give satisfaction are (W)RIGHT. Built for all cars. We have in stock—

Ford T. and all Buick models.
Michigan F-1911. Vellie 30-1909.
Oakland 24-1911. Parry 1910.
Hudson 20-1910-11. Hupmobile 1910-1911.

WRIGHT COOLER AND HOOD CO.,
8th St., Muskegon, Mich.

REPAIR MEN — REMAGNETIZE YOUR own magnetos with latest and best electro-magnet coil, operated from dry-cell batteries, sold under an absolute guarantee. Price \$15.00.

WILLIAMS ELECTRICAL CO.,
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"SAFETY FIRST"

Most accidents are caused by "cloudy" glass fronts. Our patented glass front cleaner removes rain, snow and "breath-steam" from windshield instantly. Made of brass; cannot rattle; always ready; operates from driver's seat. Send two dollar bill for one today and be safe. Tomorrow you might have accident costing two thousand, maybe life. MARSHALL, WALTER & CO., Milwaukee, Wisconsin.

"SAVE YOUR GASOLINE."

We have 150 Rayfield carburetors, regular \$20.00 kind. Our price \$8.20 while they last.
PURITAN MACHINE CO.,
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SHINAUTO — THE GREAT PRESERVER.

Keeps auto like new without washing. Prevents cracking and checking of varnish. Makes old cars like new. Guaranteed. Saves paint bills. Trial can 50c by mail. Enough for two months' treatment.

SHINAUTO MFG. CO., INC.,
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SLAUGHTER SALE OF GAS TANKS

We have 200 Prest-O-Lite large size Gas Tanks, new, complete—worth \$25 each. Your Money Order or Certified Check for \$12 brings tank complete by return express.

CUT PRICE GAS TANK SALES CO.,
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SCHEBLER MODEL "L" CARBURETORS, new 1½-inch, \$8.00 each. Order early. Kent Motor Car Co., Kenosha, Wis.

START LITE GAS LIGHTER.

Light your gas lamps instantly from driver's seat without stopping. Regular price, \$15.00. Our price, \$8.00 complete.

FRED ALLEN AUTO SUPPLY CO.,
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STOP! NO GAS.

Our gasoline gauge tells you exactly the amount of gas in your car. Just state car. Put 15c in stamps in envelope and mail. Sent postpaid. The Browne Supply Co., 126 Erie St., Toledo, Ohio.

STOP THAT LEAK IN YOUR RADIATOR with one ounce of Overton's Radiator Leak Compound. A pound can by parcels post for 50c cash. N. L. Overton, 1109 4th Ave., Council Bluffs, Iowa. Prices to Dealers.

"STOP THIEF"

Patented lock for Ford and other small cars. Impossible to start motor. Two keys with each lock. Sent prepaid, \$1.50. May save price of your car.

MARSHALL, WALTER & CO.,
Milwaukee, Wisconsin.

TOPS BUILT, RECOVERED AND RE-PAIRED. Also Top Covers, Radiator Covers. Luggage Cases, Celluloid, etc. C. G. Meyer & Son, Tiffin, Ohio.

TOURING ROADSTERS, RACING BODIES, Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.

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TRUSS ROD FOR FORD CARS.

200 in use in St. Louis. Prevents sagging and breaking of rear axle. Takes ten minutes to apply. Best on the market. Guaranteed two years. \$2.50 prepaid.

SPECIALTY SALES CO.,
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THAT MYSTERIOUS RAG DUSTER.

For dusting and polishing automobile bodies, windshields, lamps, pianos or any other polished surface. House Size 25c. Automobile Size 50c. Sent to any address upon receipt of price. If not satisfied, return duster and we will refund purchase price.

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TRUFFAULT — HARTFORD SHOCK AB- sorbers; \$45.00 kind; \$20.00 set of four.

PURITAN MACHINE CO.,
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U-O-2

Polish your nickel and brass the E Z way with

MARVEL POLISHING CLOTH. Indispensable in the garage. Once tried always used. Twenty cents. Agents wanted. Marvel Novelty Company, Nyack, N. Y.

WE HAVE JUST TAKEN IN EXCHANGE

2-ton Saurer chassis in fine condition. 4 speed transmission direct on 3d, 4 cyl. long motor. Bosch high tension magneto. Condon, 2635 Wabash Ave., Chicago.

WE MAKE FORD RACING TYPE BODIES in several models for immediate delivery.

AUTO SHEET METAL WORKS,
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WE TEAR 'EM UP AND SELL THE PIECES

We want old autos, condition no object. We will buy anything for the auto. We have all kinds of parts, many of them new, at unheard of low prices. Tires and tubes, many new, others used. Kingston carburetors, all sizes; will exchange for others. Gears of all kinds, new gas oval tanks, new timers, magnetos, coils. Stewart speedometers, shafts and chains, tire covers, dust hoods, electric horns, new brass bumpers, lamps, all kinds, Prest-o-Lite tanks, oilers, cylinders, pistons, transmissions, crankshafts, seats and bodies; new 30x3½ wheels, many other used sizes; rims; several chassis without engines, 2-cylinder, 4-cylinder, 6-cylinder engines, springs; in fact, everything that an auto needs. Correspondence solicited. If we do not have it, will advise you where you can get it. Anything bought can be returned at once, unused, carriage prepaid and we will refund amount paid.

AUTO WRECKING CO.,
Old Church, 13th and Oak,
KANSAS CITY, MO.

WESTON MOTT HIGH GRADE REAR axles, \$45.00. Other bargains, too.

PURITAN MACHINE CO.,
412 Lafayette Blvd., Detroit, Mich.

50 NEW PRESSED STEEL FRAMES, 163" long, 34" wide. Each, \$10.

Sent for sketch.
Lucas & Son, Bridgeport, Conn.

FORD AUTOMOBILE SPECIALTIES.

Look for the APCO on the box. If you see this trade mark, you are safe in every way, for it means "Every sale a sale of satisfaction." Your money will be cheerfully refunded if you are at all dissatisfied. The APCO goods cost you no more, so insist and don't let your dealer sell you "something just as good" and on which all sales are final. He makes more money, but where do you get off? Remember if your dealer won't refund your money, we will. You buy APCO and let the other fellow get the imitation. Sold the World Over. AUTO PARTS CO., PROVIDENCE, R. I. The originators and largest manufacturers of Ford Specialties in the world.

Cycle Car Accessories**CYCLE CAR PARTS.**

Front axles less hubs.....\$ 2.50
Wood wheelsEach 1.00
Spring clipsEach .04
TransmissionsEach 10.00
Pressed steel frames.....Each 2.00
Lever control steering controls.....Each 2.00
Front and rear springs.....Each .75

AUTO PARTS CO.,
737-739 Jackson Blvd.,
CHICAGO.

STEERING KNUCKLES, YOKES, FRONT axles, springs, wheels, and friction transmissions.

MINNEAPOLIS MOTOR CO. AGENCY,
1123 Michigan Ave., Chicago.

V PULLEYS, 1½x7, ALSO FLAT BELT pulleys 2x7.

F. MacVicar,
214 Milton Ave., Syracuse, N. Y.

Cars Wanted

AUTO WANTED — WILL LOAN YOU money on your car or sell same. American Storage Co., 5025 Wabash Ave., Chicago, Ill. Phone Midway 3233.

FOR SALE — 160 A. FARM IN NORTHERN Minn. at \$20.00 a.; improved A1 land. Will take small auto as part payment. E. H. Keller, Marshalltown, Ia.

WANTED — TO TRADE 160 ACRES OF land in Colorado for 1914 6-cylinder touring car, Chalmers or Buick preferred. G. W. Allen, Portland, Mich.

Parts and Accessories WANTED

WANTED — SECOND GARAGE EQUIP- ment. Lathe, Drill press, Large air compressor and other garage equipment. Write me what you have giving price and full description.
C. P. Buswell, Meriden, Iowa.

WANTED TO BUY A GOOD 4 CYL. OR 6 cyl. gasoline motor.
Greer College of Motoring,
1456 S. Wabash Ave., Chicago.

WANTED TO BUY — PREST-O-LITE AND other make gas tanks for cash. Walter R. Ebert, 959 34th St., Milwaukee, Wis.

Situations Wanted

AN EXPERIENCED BODY BUILDER DE- sires position as foreman or superintendent; good organizer and reliable; can furnish best reference as to executive ability. Box E 46 c/o Motor Age

EXPERIENCED MAN IN AUTOMOBILE business desires to represent and travel for specialty or accessory house on Pacific Coast. Will use my own car. Best references. Address Box E 52, c/o Motor Age.

TOP DEPT. OR FACTORY SUPT.

Man with 9 years' experience as head of top department and factory, desires similar position. Best credentials furnished. Address Box E 38, c/o Motor Age.

PHILADELPHIA SALESMAN.

Ten years' experience, energetic, formerly Phila. Branch Mgr. for large corporation. Well known among Phila., Baltimore, and Washington Trade, is open for high grade proposition. Salary and commission. Address Box E 49, c/o Motor Age. b

POSITION WANTED—SUPERINTENDENT or assistant; 20 years of practical mechanical experience; 12 years executive; thorough knowledge of piecework and premium systems; a hustler and has always been very successful in getting results; at present employed in responsible position. Address Box E 25, c/o Motor Age.

YOUNG MAN DESIRES POSITION AS foreman or floor manager of garage having agency for some car, where could help with the sales end. Have had more than six years' experience in the automobile business, having learned it from the ground up in the assembling, testing end. I am now a partner in an "Automobile Rebuilding, Repairing & Paint Shop" in a town of 15,000 in the middle west, also handling used cars. Can furnish best of references as to character and ability. Can handle men and customers. For further information address Box E 48, c/o Motor Age. k

YOUNG MAN, 27, SINGLE, RECENTLY out of college, would like position as demonstrator or salesman with factory branch or sales agency where there is a chance for advancement. Have been driving own cars for the last five years. Four years' business experience before going to college. Address Box E 47, c/o Motor Age. h

Help Wanted

AUTO RACING DRIVERS WANTED TO join well known team; salary and season's guarantee; must have own cars. Address Box E 53, c/o Motor Age.

SALESMEN DESIRING A FINE, QUICK- selling, profitable side line, should address GATES MFG. CO., Indianapolis, Ind.

SALESMAN FOR CITY OF 100,000 AND some territory work. Good selling line thoroughly advertised. Exceptional proposition to real salesman. Order takers need not answer. Address Box E, 33, c/o Motor Age. c

SALESMEN WANTED FOR QUICK SELL- ing automobile and hardware standard specialties; exclusive territory to live men. Motor Parts Co., 229-231 W. Erie St., Chicago, Ill.

"SALESMEN WANTED—TO HANDLE AN excellent side line to the Garage and Motor Accessory Trade. Not a proposition for jobbers. A large company with an established reputation and with an advertised line can use a number of men. State line you are handling now, territory covered, references and consent of other houses represented required. Give full information. Address, Gelhaus, 410 New St., Cincinnati, O."

WANTED—A "FIRST-CLASS" REPAIR man in garage, located in western Ill.; must be familiar with wiring and lathe work; state whether married and age, also what wages you demand, with A1 references. Address Box E 39 c/o Motor Age. s

WANTED APRIL FIRST. Competent general repair man for steady position. Give references and full particulars as to experience and wages expected. Fredericksburg Auto Co., Fredericksburg, Iowa.

WANTED AT ONCE—WORKING SHOP foreman for garage in small Illinois city. Must be able to handle all kinds of trouble and repairing and to manage a shop. Must show a good record for past work. Do not apply unless you can fill the bill. Give full particulars. Address Box E 50, c/o Motor Age. o

WANTED—AUTO ACCESSORY SALESMAN to carry our line either as a complete or side line. Offer an attractive proposition in any state. Box E 18, c/o Motor Age.

WANTED — CARBURETOR SALESMAN and demonstrator. Must give best reference. Address Box E 34, c/o Motor Age.

WANTED—FIRST CLASS AUTO REPAIR and lathe man; must have reference; state salary, experience and reference in first letter. Tennant Bros., Stanberry, Mo.

WANTED—COMPETENT ALL AROUND automobile repair man to take charge of small garage. Must have a fair knowledge of electric starters. Married man preferred. State salary expected and give references. Address, Box E 43, c/o Motor Age.

WANTED—FIRST-CLASS AUTO REPAIR man and lathe hand. Steady job to reliable man. Address Box E 31, c/o Motor Age. s

WANTED—SALESMEN, BOTH TRAVEL- ing and local, superintendents, designers, draftsmen, engineers, desiring to be placed in touch with high grade positions with automobile factories, and who can hold such positions down, should write immediately to The Michigan Co-operative Co., 1532 Dime Bank Bldg., Detroit, Michigan.

WE ARE CONSTANTLY IN TOUCH WITH Employers requiring High-Grade Engineering service. Are you listed with The Toledo Engineering Agency, Toledo, Ohio?

WE SEEK THE SERVICES OF A MAN

Whose abilities and experience have established him

IN THE DIRECTION OF SALES.

A company, one of the largest and most stable manufacturers in the automobile industry, desires for a Sales Executive position a man whose record warrants the immediate assumption of large responsibilities; a man widely experienced in organization along modern intensive lines, together with an accurate appreciation of advertising values and broad commercial insight.

Experience in the automobile industry is not essential. Your communication with us has every assurance of confidential consideration.

Address Box E 51, c/o Motor Age.

Wanted—Agents**AGENTS WANTED.**

Attractive terms to dealers on our Ampvo Batteries. Some exclusive territory still open.

The Ampvo Battery Co.,
3031 Michigan Ave., Chicago, Ill.

AGENTS WANTED TO CALL ON GA- rages, machine shops, factories, mills, etc., selling extensively advertised welding apparatus. Demand already created. Will give exclusive territory together with cooperation to right parties. Exceptional commission.

COX BRASS M'FG CO.,
Albany, N. Y.

AUTO ACCESSORY SALESMAN WANTED to sell our guaranteed auto tire reliners, double locks, inner and outer shoes, etc. Liberal commissions and exclusive territory. AMERICAN RUBBER PRODUCTS CO., 24 So. Clinton St., Chicago, Ill.

EXCLUSIVE AND SIDE LINE SALESMEN for spark plugs and accessories. Well established. Good chance for right man. Sturdy Mfg. Co., 2637 Mich. Ave., Chicago.

MOTORISTS TURN LEISURE TIME INTO money, selling tires to friends. Want local agents throughout Colorado, Wyoming, New Mexico and adjacent territory. Liberal commission. No investment required. Write for particulars. Boss Rubber Co., 1606 Broadway, Denver, Colo.

WANTED—AGENTS TO SELL PORTABLE Welding plants, Oxygen carbon removers, Electric horns, C-Well rear sight Mirrors, Skidoo Soap and Milwaukee Auto Specialty Co.'s line. Exclusive territory and liberal commission to the right parties able to devote their entire time to their sales. STEWART AUTO ACCESSORIES CO., 1509 S. Michigan Ave., Chicago.

YOU CAN GREATLY INCREASE YOUR income by representing our line of lighting systems; our MATCH LIGHTING LAMPS sell like wildfire both in town and rural districts. No experience required, profits large, exclusive territory to right parties. Don't delay writing for free catalogue and full information. Doud Lighting Co., 175-F No. Sangamon, Chicago.

Agency Wanted

GENERAL AGENCY—A 40-YEAR-OLD Danish machine firm wants to represent an American motor car company. Reply to 6558 Sylvester Hvid, Nygade 7, Copenhagen, Denmark.

WANTED—EXCLUSIVE SPECIALTIES OR patent right to manufacture by a well-organized New York sales corporation. Suite 1928, 30 Church St., New York City. u

Business Opportunities**BIGGEST BARGAIN**
In the United States for the
RIGHT MAN

World-Famed Columbus Buggy Company plant for sale by creditors' committee. Seven acres of ground, two large buildings, each 100x400, four stories, and several smaller buildings, completely equipped for the manufacture of buggies and automobiles of all kinds. Appraisal at cost aggregated \$600,000.

COLUMBUS WILL HELP THE RIGHT MAN save the industry for the city.
Address

JOHN A. KELLEY,
Manager Industrial Bureau,
Chamber of Commerce,
Columbus, O.

FOR SALE—GARAGE AND COMPLETELY equipped machine shop, building, ground and tools for \$3,400; no trades. For particulars write Jos. Slagel, Fairbury, Ill.

FOR SALE—GARAGE IN A PROSPEROUS Western city; all modern; largest storage capacity. Ford Agency.
Box E 30, c/o Motor Age. k

FOR SALE—UP TO DATE MODERN garage and auto supplies.
Address
Box E 11, c/o Motor Age. r

INVENTIONS EXAMINED, PATENT AND Working Drawings made. Models developed and built. Free report as to patentability and cost for development of your invention. Address Inventions, Dept. A, The Toledo Engineering Agency, Toledo, O.

OPPORTUNITY FOR PARTY WITH \$5,000 to \$10,000 capital to secure Buick agency in one of Idaho's best cities; population 6,000. Randall-Dodd Auto Co., Ltd.
Salt Lake City, Utah.

SALESMAN AND BROKER—CAN PUT you in touch with business who want to go in automobile business. What commission will you pay me on each customer I send you? I know a salesman also who would buy interest in small factory making low priced automobiles and trucks.
Address

DAN J. MURRAY,
3 Maiden Lane, New York.

WILL LEASE WELL EQUIPPED REPAIR shop in live town in the sunny south to first-class auto repair man, middle aged married man preferred. No investment required. Shop will keep four or five men busy all year around. Address Box E 37, c/o Motor Age.

Portable Garages

PRIVATE GARAGES. GALVANIZED-
steel or wooden. The finest line offered.
If interested write. **GARAGE FACTORY,**
Beaver Springs, Pa.

Tires

A1 GUARANTEED TIRES.
UNITED STATES, GOODYEAR, LEE,
FEDERAL AND OTHERS.
What size?
Write for my price bulletins.
We pay express charges.
ALLEN S. SINSHEIMER,
1503 Michigan Ave., Chicago, Ill.

BARGAINS IN 600 NEW TIRES AND 400
used repaired tires. Any size.
New. Used. New. Used
30x3 ...\$7.40 \$5.00 34x4 ...\$15.50 \$10.00
30x3 1/2 ...10.50 7.00 36x4 ... 14.50 10.00
34x3 1/2 ...10.50 8.00 35x4 1/2 ... 19.50 11.00
32x3 1/2 ...10.90 7.00 36x4 1/2 ... 19.85 11.00
36x3 1/2 ...11.50 8.00 37x4 1/2 ... 20.50 12.00
All other sizes in proportion.
SERLIN TIRE CO.,
1073 W. 14th Place, Chicago, Ill.

HIGHEST GRADE GUARANTEED TIRES—
MICHELIN, GOODRICH, GOODYEAR,
DIAMOND. No seconds. We can quote you
a very attractive price on any of the high-
grade makes. Write for prices, stating size
wanted. We sell for cash, and can under-
sell others.
SPECIALTY SALES CO.,
Rochester, Illinois.

I WILL SELL YOU CLINCHER OR
straight side tires, either firsts or seconds,
cheaper than any one in the United States.
D. OGDEN,
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ROCK BOTTOM PRICES
On Tires, Tubes and Relineers.
New and used. Write for prices.
ACME TIRE & REPAIR CO.,
1547 Michigan Ave., Chicago.
Phone Calumet 3127.

STANDARD GUARANTEED LINES.
What make do you prefer?
We pay the express charges.
30x3\$ 9.90 34x4\$19.95
30x3 1/2 12.95 37x5 34.70
All sizes. Prices in proportion.
Shipped subject to examination on receipt of
10%. We pay express; you pay C. O. D.
ALLEN S. SINSHEIMER,
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TIRES

22 years in the Rubber business. It is the
reputation that counts. Expert tire repair-
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Manufacturers for U. S. and Canada for the
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standard makes. Get our prices before buy-
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TIRE DEALERS AND GARAGEMEN!!
Write for our special tire bulletin on blend-
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in America on this class of goods.
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ALL MAKES OF MAGNETOS AND COILS
repaired, bought, sold and exchanged.
Service station for Simms, Michigan and
National. Mail orders given special atten-
tion. Get our prices before going elsewhere.
Hecht Magneto Exchange,
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MAGNETOS
Repaired, remagnetized; prompt service on
all makes.
Get our exchange proposition on new K-W
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Spark Coil, Storage Battery and Carburetor
Repairs.
Northwestern Distributors.
K-W magnetos, Schebler carburetors, Vesta
lighting equipments.
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REINHARD BROTHERS CO.,
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BOSCH MAGNETOS.

DUAL-DUPLEX AND INDEPENDENT.
Prices are Low.
BROWN & CAINE,
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ALL MAKES OF MAGNETOS AND COILS
repaired the same day received. All work
guaranteed. Our new prices on magnetos
and coils will interest you.
PELLET'S MAGNETO EXCHANGE,
1606 Michigan Avenue, Chicago, Illinois.

STARTING AND LIGHTING SYSTEMS
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paired. We charge no more for expert ser-
vice than other concerns do for novices at
the business. Rewinding of all kinds. Estab-
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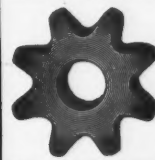
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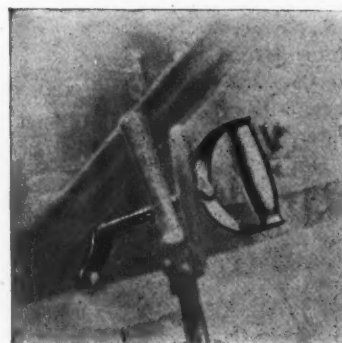
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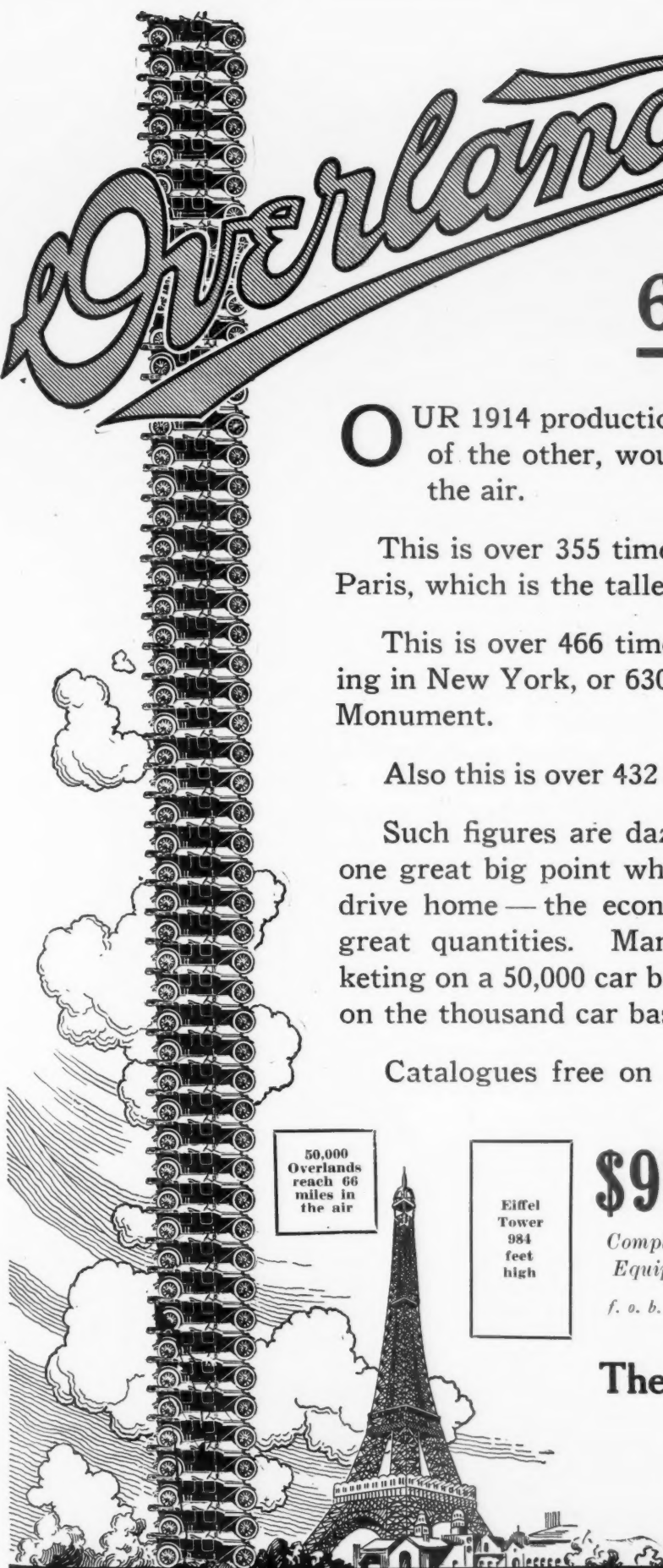
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*Manufacturers of the famous Overland Delivery Wagons,
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Full information on request.*



The Athlete of Travel

Highest efficiency is the perfect combination of power and lightness. Power must be in the most compact and economical form; the Gnome aeroplane motor, the sail speed of the yacht, the high power motors in the power boat, or the wiry arms and bodies of the oarsmen. And the craft driven by this power must combine lightness and the strength to stand up under every strain.

The absurd idea that weight and bulk meant power is disproved every day. No one any longer believes it.

We saw this long before other automobile manufacturers were able or willing to make the necessary outlay to investigate and prove, and disregard the precedent of years. Paris sets the pace in automobile manufacture and from Paris direct we took the latest ideas, ideas which mark an epoch in motor car development.

Unlimited capital and long years of experience enabled us to give to the public the new Jeffery. Equipped with a light high speed bloc-type motor, the car combines the qualities of lightness, power, economy, beauty and comfort in the highest degree. *And the price is moderate—\$1550.*

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Vanadium steel springs, axles and driving shaft.
Daimler flexible leather couplings, largely eliminating transmission friction.
U-S-L starting and lighting system.
Imported annular ball bearings.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

